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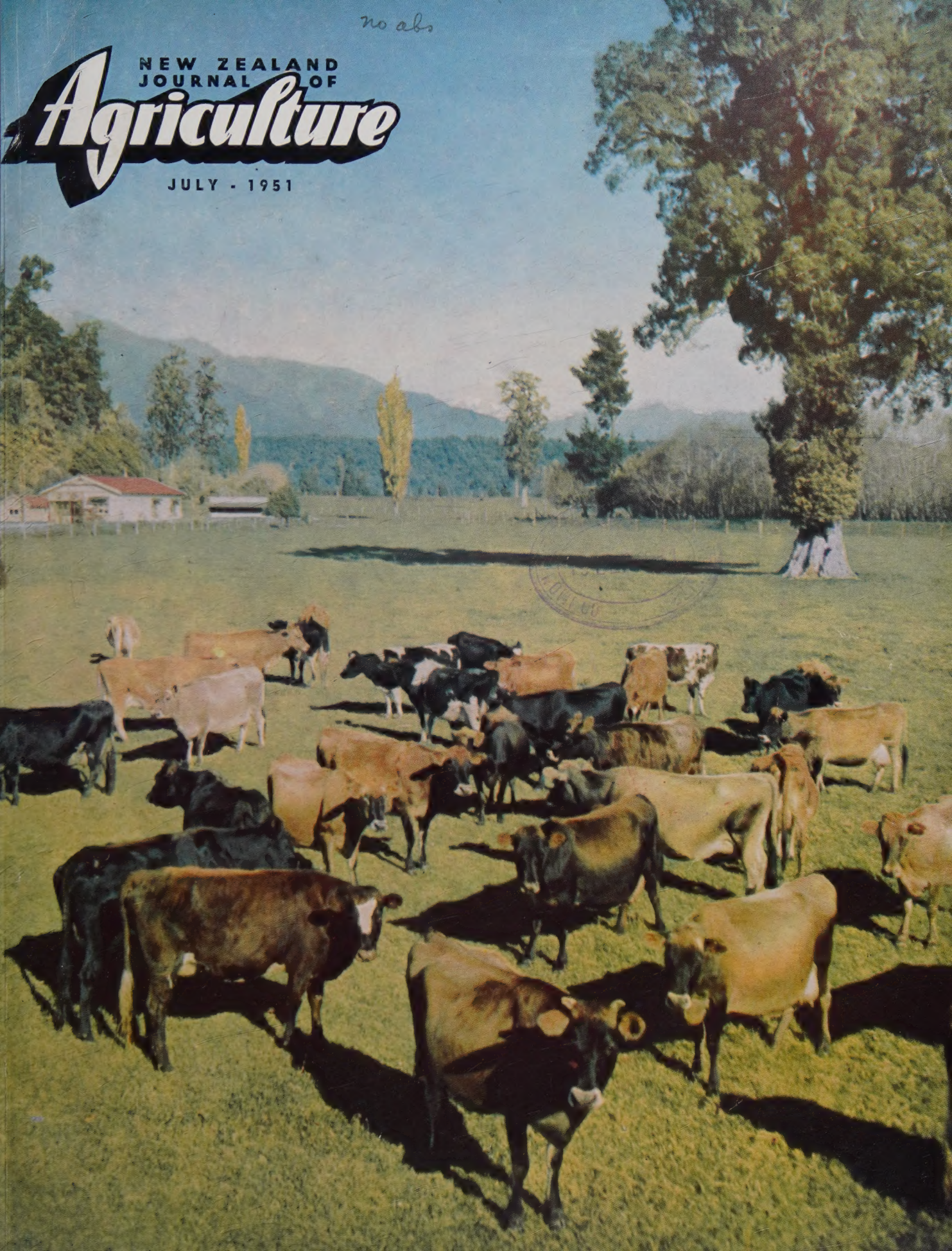
NEW ZEALAND JOURNAL OF Agriculture

JULY - 1951



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This Month's Cover

This month's cover, which has been reproduced from a colour photograph by National Publicity Studios, shows part of the farm of Mr. F. Wyatt, Fernhill Valley, Harihari, south Westland. Dairy farming is the most important activity in Westland, there being about 12,000 dairy cows in the province, in which there are four butter factories, the combined annual output of which is about 1600 tons. The peak which appears in the background of the cover illustration is Mt. Elie de Beaumont, 10,200ft.

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Westland

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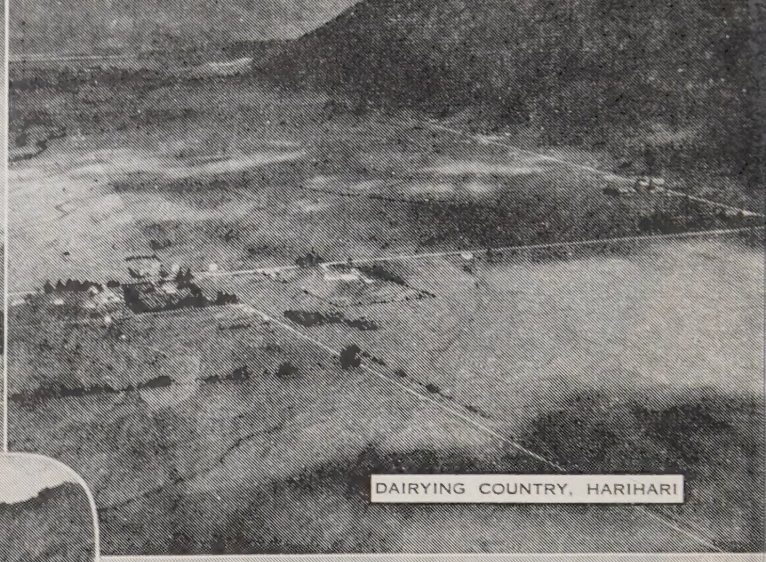

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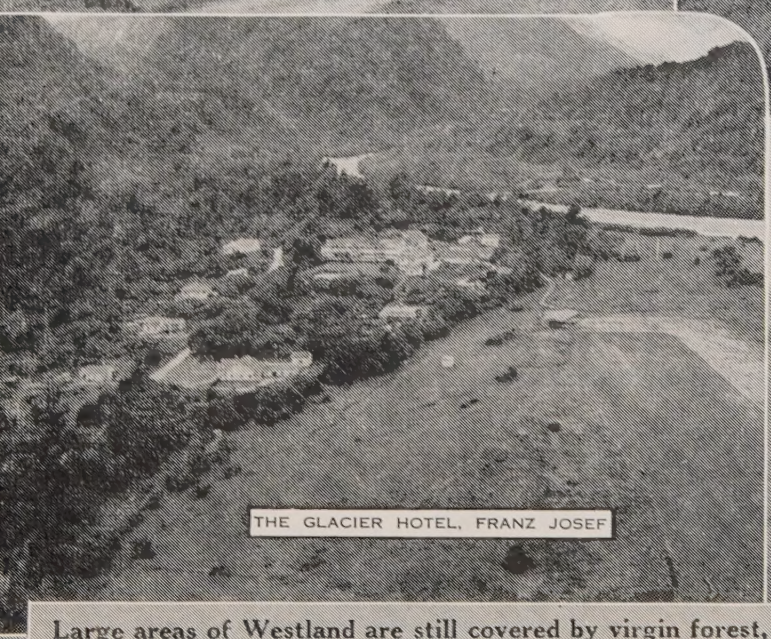

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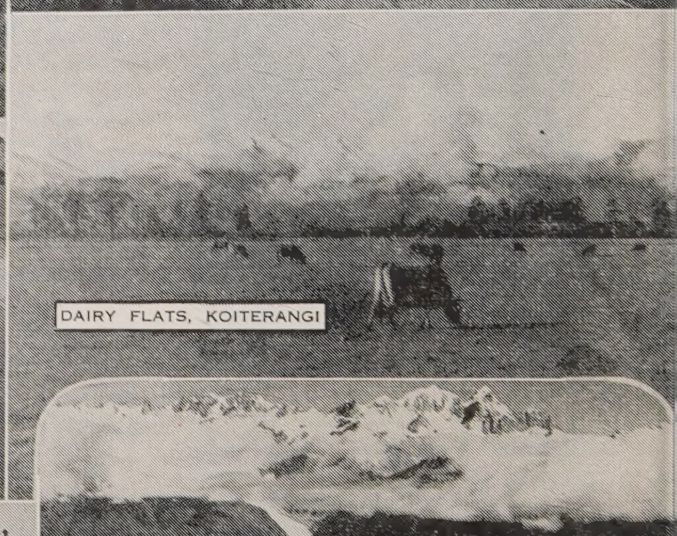

DAIRY FLATS, KOITERANGI

WAIHO RIVER VALLEY

Large areas of Westland are still covered by virgin forest, particularly on the steeper hill country, and it is extremely doubtful whether the breaking in of more virgin country is yet warranted. However, on much of the flat and easier land axe and fire accounted for the bush and forest, though not all this country has been put to agricultural use. On many of the early bush-burn areas sheep have retreated in the unequal struggle against second growth, but a large proportion of such land is capable of improvement.

[Photographs at top and bottom left by National Publicity Studios; aerial photographs by V. C. Browne.

FAT CATTLE, SOUTH WESTLAND

SECOND GROWTH, GREY RIVER VALLEY

SULPHUR AND FERTILISERS

REDUCED allocations of sulphur to New Zealand from the U.S.A. have been met in part as they affect superphosphate manufacture by the decision to adopt "bulked-up" mixtures to eke out supplies. It appears certain, however, that we cannot depend on a resumption of full requirements of sulphur from the sources on which we have hitherto relied, and as we have become so dependent on superphosphate in our farming, the position has been thoroughly studied with a view to making whatever long-term adjustments of our fertiliser industry are possible.

Sulphur is used in many commercial processes, particularly in the form of sulphuric acid. Chemical, fertiliser and insecticides, pulp and paper, paint and varnish, and explosives industries are the principal users, but in this country superphosphate manufacture accounts for over 95 per cent. of the total imported. The application in 1904 of the Frasch process of extraction to the American salt dome deposits ushered in a new era of cheap, plentiful sulphur. The American supplies rapidly supplanted the more expensive and less pure supplies from Sicily, and in large measure superseded the use of pyrites.

Sulphur usage continued to expand rapidly. For instance, last year Britain used twice as much as she did 25 years ago; but a U.S. geological survey in 1944 estimated that there remained only about 80 million tons of sulphur in the salt domes. During the next 6 years some 25 million tons were extracted, and as usage now exceeds 5 million tons annually, less than 11 years' supply is estimated to remain.

Last year the American and British authorities took the initiative in setting up in Washington, U.S.A., an International Materials Conference to endeavour to meet the situation arising from the world shortages of several commodities. This conference set up a number of committees, one of which is the Sulphur Committee, on which New Zealand is represented.

The Sulphur Committee in its first report stated that world supplies would fall short of requirements for 1951 by more than a million tons. The sulphur shortage is not one of short duration caused by stockpiling to meet defence needs; the steady expansion of world industry has led to a sulphur demand of such size that it cannot be met from present sources.

In its first report the Sulphur Committee suggested as the chief means of supplementing supplies of sulphur the greater use of pyrites, anhydrite, and gypsum, and the greater recovery of sulphur from various industrial processes. It suggested more extensive exploration for new deposits of sulphur in various forms, and also pointed to a number of ways of conserving supplies.

This report, although extremely valuable, has only limited application to New Zealand. We have no deposits of pyrites of commercial significance. Our deposits of native sulphur, which are scattered throughout the geothermal areas, have been estimated to contain altogether about 17,000 tons of the element, whereas we used 73,000 tons in superphosphate last year. There are no significant deposits of anhydrite or gypsum here.

Our chief interest in the report lies in the suggestions relative to fertiliser manufacturing processes which do not require sulphur. The following brief table shows how usage of sulphur for superphosphate in New Zealand has increased:—

	Tons
Year ended March 31, 1927	22,785
Year ended March 31, 1930	29,421
Year ended March 31, 1935	36,453
Year ended March 31, 1940	51,079
Year ended June 30, 1945	46,500
Year ended June 30, 1950	72,957

Superphosphate is an extremely useful fertiliser, and it has the great virtue of being cheap and easy to make. There are both technical and economic obstacles to the immediate conversion of our industry either to the use of pyrites or to the production of some other type of fertiliser. Our works are designed to make only superphosphate using high-grade American sulphur. Lower-grade sulphur from other sources gives trouble in manufacture. To convert the acid plants to using pyrites will entail considerable expenditure in new burners; such expenditure would need to be justified by the assurance that regular supplies of good-grade pyrites were obtainable.

If we decide to produce some other type of phosphatic fertiliser, the works will need to be extensively altered or new works built. Most alternative processes involve high furnace heats which cannot be attained at present because we have neither the coal nor the electricity.

The Sulphur Committee has recently announced world allocations for the third quarter of 1951; we are to get 16,600 tons, and it is thought likely that this allocation will be repeated for the fourth quarter. This represents an annual rate of 66,400 tons. By continuing the present system of supplementing supplies by adding other materials (ground rock phosphate, serpentine, or lime) we should be able to maintain the present level of primary production in the meantime.

We must, however, look immediately to planning for the future. The subject is a very complex one, and we must therefore proceed very cautiously. Our tasks for the present are to assemble all relevant information. We have already approached the Australian Government with a view to participating in the exploitation of the extensive deposits of gypsum and pyrites which occur in that country. Discussions with the superphosphate manufacturers have already commenced, aimed at arranging for the adaptation or extension of the industry to meet the new situation. The Government has arranged for an American expert of world standing, Dr. G. L. Bridger, to visit this country and advise us as to the best lines of development. The Government hopes to be able to decide on future policy shortly after receipt of his report.

K. J. HOLYOAKE, Minister of Agriculture.

Feeding of Sheep in Canterbury

CANTERBURY has a balanced and well-developed sheep industry based on store-sheep production on the hill country and fat-lamb production on the plains. More than 5,000,000 sheep are carried, producing about 50,000,000lb. of wool and 2,500,000 fat lambs a year. In this state of high productivity feeding is the most important factor. A century of farming in Canterbury has been responsible for an accumulation of practical knowledge on sheep feeding. To this knowledge is now added the results of experimental work carried out during the past 10 years by the Department of Agriculture and Canterbury Agricultural College, Lincoln, at the Kirwee experimental farm and at the college. This is the first section of an article, to be concluded in next month's "Journal", by I. E. Coop, Professor of Animal Husbandry, Canterbury Agricultural College, in which an attempt is made to weld together information from the two sources. It will become obvious that there is still much to be learnt.

PARTICULAR reference is made in this article to the feeding of sheep on the cropping plus fat-lamb farms typical of the Canterbury Plains. The feeding of breeding ewes is the main subject dealt with in this section; the fattening of weaned lambs and the rearing of ewe hoggets will be discussed in next month's "Journal".

Feeding of Breeding Ewes

In Canterbury about 60 per cent. of the ewes are fine-woolled half-breds or Corriedales, the remainder being Romneys and three-quarter-breds. Cull 2-tooth and cast-for-age ewes from the hill country are the source of the breeding stock for the fat-lamb country. Aged sheep predominate, so most ewes on the plains land are 5 to 7 years old. Canterbury is the only part of New Zealand where some 20 per cent. of the rams used for fat-lamb production are of breeds other than the Southdown. The relative merits of breed of ewe or sire will not be considered, but only the feeding of ewes irrespective of age or breed.

The feeding of breeding ewes may be related to the three separate physiological stages completing the breeding cycle—the dry period of 3 months from weaning to mating, the pregnancy period of 5 months until lambing, and the lactation period of 4 months from lambing until weaning. These three periods are taken as January to March, April to August, and September to December, which are typical of the South Island.

Feed requirements vary considerably both between and within the three stages. Briefly, the dry stage and the first half of the pregnancy stage represent the period of minimum productivity of the ewe and therefore of minimum feed requirement, the later stages of pregnancy are a period of increased requirement, and finally the period of maximum requirement is reached from lambing until weaning. Though this may indicate what should be provided for the ewe, the provision of such feed in practice is complicated by the marked seasonal nature of pasture growth in Canterbury and by costs of feed production, which also vary with the seasons.

Dry Period (January to March)

During the period from weaning to mating the ewe is producing wool alone at the rate of ½ to 1lb. per month. If the ewe is in average condition after weaning, the feed required will be only that needed to maintain body weight. Such requirements are easily met. The ewe can be maintained on a limited amount of feed, which need not be of good quality. For such a purpose the dry pasture with stalk and seed-head normally available from January to March is quite satisfactory. As such pasture is the normal carry-over from early-summer growth, feeding during this period is relatively simple.

After a very dry summer with no excess growth, or a continuation of drought conditions into autumn, the provision of a limited amount of supplementary feed such as hay, chaff, or silage is advisable to prevent the ewes from losing too much condition. Some loss in condition can be tolerated easily, but it should not be excessive.

If the ewe is thin at weaning because of having reared twins or done her lamb well, she should be given preferential treatment. In contrast, fat ewes should be starved during January and February to reduce their condition before they are mated. This applies particularly to ewes which have spent the previous year on the plains, for ewes off the tussocks are seldom too fat. Fat ewes are poor breeders and difficult lambers.

After weaning, the ewes should be divided where possible into two or possibly three mobs and given differential feeding according to their condition.

The dry period also brings the start of flushing, which consists of an improvement in nutrition shortly before and during the early stages of mating. Knowledge on this subject is not particularly accurate, but flushing normally causes a greater number of ewes to bear twins, so increasing the lambing percentage. The improvement in nutrition is best brought about by greenfeed, such as pasture, lucerne, or rape. In a dry autumn when no green material is available hay, chaff, or silage may be used to advantage. Rams should be prevented from becoming too fat and should be flushed shortly before mating to improve their fertility and vigour.

Pregnancy Period (April to August)

After the ewe has been mated the foetus (unborn lamb) develops very slowly during the first 3 months and causes no appreciable increase in the feed needed by the ewe. Only during the last 4 to 6 weeks before lambing is growth of the foetus sufficiently rapid to influence the food requirements of the ewe. Consequently, if the ewe is to be fed in accordance with her requirements, the maintenance level of nutrition applied after weaning can be continued into June, but thereafter the diet should improve in both quantity and quality.

The feed supply normally improves in April and May as a result of autumn rains. In certain seasons this autumn flush of pasture may come early enough to be used for flushing the ewes. It is of high quality and

[*Canterbury Agricultural College photo.*

Ewes should be lambed on to good saved pasture or greenfeed.

[*Canterbury Agricultural College photo.*

Hay, and especially lucerne hay, should form the basis of winter feeding of breeding ewes.

though ewes undoubtedly benefit from it, the quality and sometimes the quantity are more than are needed to meet the food requirements of the ewes at that time. For this reason as large a proportion as possible of this autumn growth should be saved, by closing the paddocks, for a time when it can be used to greater advantage—as lambing feed. Such autumn-saved pasture may need light controlled grazing during early winter and may be damaged slightly by frost, but it can be held through to early spring to form excellent greenfeed during the few weeks between lambing and the spring flush. The continuation of a maintenance level of feeding into June assists in sparing paddocks for conservation as autumn-saved pasture.

Here again judgment must be used. If the ewes at mating are in very poor condition, they will require some building up before winter; if they are fat, they should be reduced in condition before July. However, the temptation to do the ewes well from April to June while the feed is there should be resisted in favour of conservation for use from July to September.

Though full advantage should be taken of the abundant autumn flush when it occurs, unfortunately too great a reliance on the contribution it can make is unwise. In Canterbury it is not sufficiently reliable, so the growing of some sown greenfeed for use at lambing time is usually necessary.

With the increased demands of pregnancy toward August the quantity and quality of feed given should improve gradually. Hay reserves should be graded roughly for quality before winter, the poorer hay being used first and the best-quality material reserved for late pregnancy and lambing. Good lucerne or clover hay is especially valuable at this time because of its higher protein content. Turnips and swedes should be fed before lambing begins, and greenfeed should be conserved, apart from light controlled grazing during autumn and winter, for the last week or two before lambing and especially for after lambing. Such a procedure ensures a gradual improvement in the diet in accordance with the increased feed requirements of the ewe, and it also reduces mortality of ewes before and at lambing.

This does not imply that the ewes should be fed generously, but only that they should be maintained on a slowly improving diet. It must not be a decreasing diet and must not cause a decreasing body condition of the ewe.

In the past the belief that generous feeding before lambing will "steam up" the ewe to produce more milk and so cause the lamb to grow faster has been common. Work at Kirwee experimental farm has shown that under average conditions on fat-lamb farms this is a fallacy. Provided the ewes are not fed so poorly that they lose considerable condition, no advantage is obtained from feeding them so well that they gain more than a little condition throughout pregnancy. If more feed is available than is required to do this, it would pay to carry more stock.

Mortality of Ewes and Lambs

The period of greatest ewe and lamb mortality is during the few weeks immediately before, at, and shortly after lambing, when as much as three-quarters of all losses may occur. Correct feeding along the lines already suggested is the main factor which can help to reduce these losses.

Records of mortality at Kirwee show that more ewes have died from sleepy sickness (also known as twin-lamb disease, ante-partum paralysis, or pregnancy toxaemia) than from any other cause. The condition is brought on by a check in the feeding during the last few weeks of pregnancy when the food requirements of the ewe, and especially of the twin-bearing ewe, are increasing. This check may result from a snowfall or from a shift from good feed to poor feed. Sleepy sickness is also encouraged by a declining instead of an improving level of feeding as pregnancy progresses.

Unlike milk fever, which can be cured by injections of calcium borogluconate, sleepy sickness can be dealt with in no satisfactory way other than by prevention. Preventing the ewes from becoming too fat in autumn or early winter, conserving the best-quality feed for late pregnancy, and providing chou moellier or good-quality hay in the event of a snowfall all help to avoid losses. Not only should changes for the worse be avoided during these critical weeks, but sudden changes of any kind should not be allowed to occur, for these are predisposing factors toward milk fever.

Though poor feeding throughout the winter, resulting in very low-conditioned ewes at lambing, undoubtedly increases ewe and lamb losses, experience at Kirwee has shown that an even more potent factor increasing mortality is too generous feeding, which causes the ewes to carry too much condition, resulting in difficult lambing, a greater incidence of bearing trouble, and the possibility of a severe check if snow falls. Provided checks and sudden changes are avoided, ewes can in fact be done fairly hard during winter without trouble and certainly with less trouble at lambing. In view of all the factors, a middle course should be steered, adequate provision being made for maintaining the ewes throughout the winter in a reasonable condition without being unduly generous.

The great majority of lamb losses occur at lambing or in the first two or three days after lambing and are caused by conditions such as bad weather and poor shepherding and by uncontrollable factors about which very little is known. Nutrition does not play a very important part, and if the ewe has been fed according to recommendations and ample lambing feed has been provided, no special feeding is required to prevent mortality in lambs.

Lactation Period (September to December)

During the period between lambing and weaning the feeding of the ewe and lamb reaches its peak. The feeding programme must be directed wholly toward producing maximum growth of the lamb. Experiments have shown

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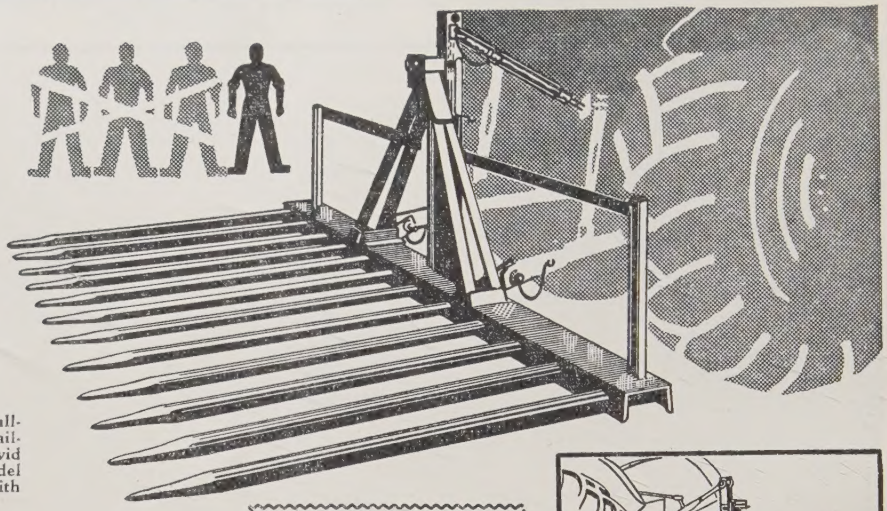

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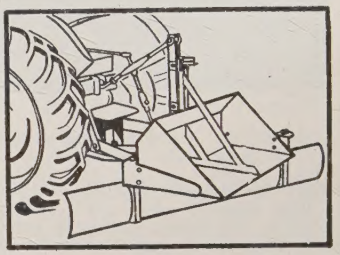

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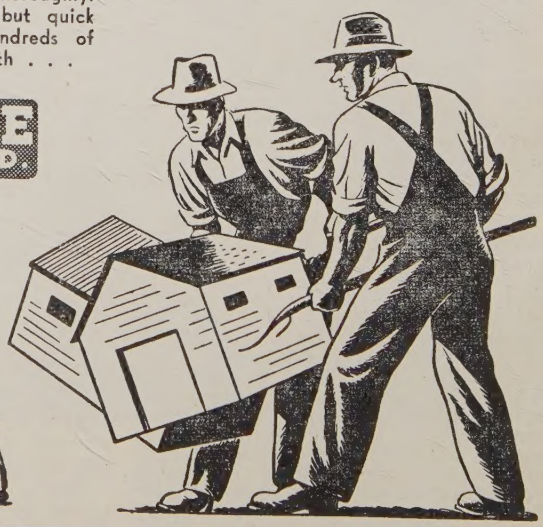

that the milk supplied by the ewe and the grass eaten by the lamb contribute about equally to the weaning weight of the lamb, the milk being more important in the first 2 months and the grass in the subsequent 2 months.

The feed requirements of the ewe during lactation are much greater than at any other time of the year. Therefore, if she is to milk heavily and so induce rapid growth in her lamb, she must be fed to capacity with high-quality feed. Further, if the feed eaten by the lamb is to make its maximum contribution, it must be high-quality pasture to stimulate the appetite of the lamb and provide highly digestible nutrients.

Convincing proof of this reasoning was obtained during investigations at Kirwee. The rate of growth of the lambs and their weaning weights were found to be dependent almost entirely on the feeding from lambing to weaning and practically independent of how the ewe was fed during the other 8 months of the year. How the ewes and lambs were fed from lambing onward made all the difference between 75 per cent. drafted at 36lb. carcass weight and 25 per cent. drafted at 30lb.

Therefore great emphasis is thrown on the provision of ample feed and, what is of equal importance, feed of high quality during the period from lambing onward.

In New Zealand lambing is so timed that the greatest advantage is taken of the main growing period of pasture—from September to December. Unfortunately in Canterbury this growing period is usually shorter than the time required to produce a fat lamb, so lambing is put forward to, on an average, 3 to 4 weeks before spring growth is really under way. Thus an extra 3 to 4 weeks is gained and lambs can be fattened before the pasture deteriorates in midsummer. Therefore special attention must be devoted to the few weeks between lambing and the spring flush.

Herein lies the greatest benefit of a carefully executed conservation programme whereby the roots and hay are used before lambing and the bulk of the autumn-saved pasture, greenfeed oats, and other greenfeed is saved as lambing feed to carry the ewes and lambs through the first month. If the amount saved is not quite sufficient, continuing to feed good-quality hay as a supplement can provide a partial solution, but once the ewes can obtain a full ration from grass or other greenfeed the hay will not be eaten.

After the spring flush has begun usually no further worries about feeding occur until December. The grass growth is excellent in quality and more than ample in quantity. In fact, the excess pasture growth should be conserved by shutting paddocks for hay or silage, unless lucerne is grown for that purpose. The final nutritional problem lies in the last month—December—when often the grass matures rapidly, runs to seed, and dries out. This causes a rapid decline in quality which after a short time is reflected in drying-off of the ewe and a decrease in the growth rate of the lamb. This maturing of the pasture can often be delayed by controlled stocking with sheep or cattle.

The longer the lambs can be kept growing rapidly, the more lambs will be drafted off the mothers and the heavier they will be. Unfortunately in the wetter and more overcast seasons favouring a continuance of grass growth into midsummer the lambs grow less rapidly than under hot, dry conditions when the feed is shorter and harder. No convincing reason has yet been advanced for this fact.

Wool Production

Good feeding of the ewe is well recognised as being essential for the production of a fleece of high weight and quality. However, farmers should be more concerned with maximum production per acre than with maximum production per sheep, though how this is to be achieved is still imperfectly known. Experiments designed to provide information on this subject are still in progress at Ashley Dene, Canterbury Agricultural College's farm on light land. Feeding trials at Kirwee showed that fleece production per ewe could be increased considerably by generous winter feeding, which also resulted in wool of higher quality. In this as well as in certain other respects high wool production appears to run contrary to economic lamb production, probably because wool growth is continuous over the whole year, whereas effective lamb production occupies less than half the year. As an example, average fleece weight could be increased 10 to 20 per cent. by generous autumn or winter feeding, but the ewes would become fat, the lambing percentage would fall, and, most important of all, the number of ewes that could be carried would be reduced; whether wool production per acre would be increased in the end is doubtful, but lamb production per acre certainly would decrease.

In the extreme, both wool and lamb production per acre will suffer either from understocking, leading to inefficient utilisation of the feed grown, or from overstocking, causing pasture deterioration and high stock losses. In between must be a happy medium, though precisely where within these wide limits is almost impossible to determine.

In view of the exceptionally high wool prices of 1951, it might pay at present to ignore the refinements of lamb production and concentrate on wool by feeding sheep at a fairly constant level all the year. The writer considers that such prices occupy a passing phase and that on fat-lamb farms lamb production must continue to take precedence over wool production.

The writer believes that maximum production, measured in terms of financial return from both lambs and wool, can be achieved by relatively heavy stocking. The methods of feeding outlined are aimed at achieving this production through a high rate of stocking plus efficient use of feed.

Food Value and Utilisation of Feeds

Only the salient features of the food value and utilisation of the feeds available to sheep in Canterbury will be discussed in this article. Crops for fattening weaned lambs will be considered in the second section.

Pasture

Whether of the unimproved brown-top-sweet vernal or the improved ryegrass-clover type, pasture forms the bulk of the feed throughout the year. While it is green and leafy it is a balanced foodstuff of high nutritive value capable of sustaining milk flow in the ewe and of producing rapid liveweight increase in the lamb. As the grass matures the food value declines, until by the time it has become mainly stalk and seed-head it is no longer a suitable feed for milking ewes and lambs.

The basic principle of sheep feeding is to relate the management of the flock to the varying quantity and quality of pasture growth. To extend the period during which pasture is green, leafy, and of high food value several methods can be adopted. The first is to use a controlled grazing system, either with sheep alone or, better still, with cattle; the pasture may also be topped with the mower. Second, paddocks may be closed in autumn to conserve leafy pasture for winter and early spring. Third, special-purpose pastures may be used to extend the normal growth period of the standard ryegrass-clover swards. Short-rotation ryegrass alone or in pasture mixtures produces growth during winter and early spring, and this strain of ryegrass is particularly palatable to sheep. Cocksfoot may be introduced for summer grazing. The use of *Phalaris tuberosa* and of lucerne-grass mixtures is still in the trial or developmental stage. Until more is known about *Phalaris tuberosa* it should be used with care, as a form of staggers sometimes develops in sheep grazing it.

Greenfeeds

Green cereals such as oats, barley, ryecorn, and Italian ryegrass are commonly grown for winter feed and lambing feeds. They are palatable and of high food value, but their carrying capacity is low. At Kirwee the average winter carrying capacity of the greenfeed alone for 3 months was only 3 ewes per acre. In consequence such greenfeed should be used to best purpose as specialty feed; that is, as high-quality material for the ewes between lambing and the onset of the spring flush of pasture. During winter it should be control-grazed only. The ewes will benefit from this occasional bite of good greenfeed during winter, especially just before lambing.

The best greenfeed is an autumn-sown new pasture containing ryegrass and clovers. Short-rotation ryegrass alone is very good indeed and superior to oats and barley.

There are no particular hazards in the use of greenfeed except that ewes accustomed to a dry and fibrous winter diet should be introduced to luscious greenfeed gradually.

Turnips

Where turnips or swedes can be grown reliably they are a most useful winter feed for sheep, mainly because of the bulk of food they give. Unfortunately on the light land they are rather unreliable, as instanced by experience at Kirwee, where the carrying capacity during the 3 winter months has varied from zero (a complete failure) to 25 ewes per acre, with an average over the years of 10.

In Canterbury sheep are customarily given access to turnips only after frost is off the ground—between about 10 a.m. and 5 p.m.—in the belief that frozen turnips cause digestive trouble; therefore a grass run-off is used in conjunction with the turnips. Another practice is to supplement the turnips with hay fed on the run-off, the purpose of which is to provide roughage to counteract the very watery nature of the turnips. If the hay is lucerne hay, the extra protein is an added advantage. In districts where haymaking is an uncertain undertaking oat-sheaf chaff may take the place of hay, though it is inferior to lucerne or clover hay in protein content.

Such trials as have been conducted at Kirwee have shown that neither the run-off nor the hay supplement confers any advantage. Ewes were wintered safely and well when confined to a paddock of turnips alone. However, until considerably more investigation is made into these points there must be hesitation in recommending that farmers follow this labour-saving practice.

With the present state of knowledge the writer's opinion is that the run-off plus hay supplement system should be continued. Hay should occupy an important place in winter feeding, and giving it with turnips is an excellent way of utilising both feeds; otherwise hay would have to be fed alone for several weeks, followed by turnips alone. A run-off has advantages as a place in which to feed out the hay and as a clean surface on which the ewes can camp.

Chou Moellier

In farming on land subject to heavy snowfalls, chou moellier has a special place for it is the only crop which will stand above the snow. Should a fall occur in the weeks just before lambing, the chou moellier can be most valuable in preventing losses from pregnancy toxaemia, as the ewes can be turned on to the chou moellier immediately. In addition, chou moellier provides a large bulk of feed capable of maintaining a heavy stocking rate. For instance, at Kirwee it wintered an average of 10 to 12 ewes per acre, which was more than any other feed.

Unfortunately at Kirwee the ewes appeared not to thrive particularly well when kept on chou moellier alone, but possibly that could be overcome by rationing it with hay, turnips, or pasture. In theory chou moellier is a highly nutritious and balanced feed.

Lupins

The bitter varieties of lupin are normally grown for ewe feeding. Experiments at Kirwee have shown lupins to be a very valuable feed for wintering ewes. The ewes do not take long to become accustomed to the taste of lupins and thereafter they thrive very well on them. Lupins on their own are a balanced foodstuff, so the feeding of hay or greenfeed as a supplement is unnecessary unless it is desired to ration the lupins. Probably because the carrying capacities obtained are not particularly high, the acreage of lupins grown now appears to have reached a steady level.

Silage

Very little silage is made on sheep farms. At Ashley Dene the practice has been to make the first early cut of lucerne into silage on the grounds that the weather then is not reliable for haymaking. The experience there has been that the sheep have relished this silage, especially during dry autumn weather, when it may be the only succulent feed available and it can be useful for flushing. It is also eaten readily during winter.

The labour involved is likely to prevent silage gaining very much ground at the expense of hay, despite silage being the better feed.

Hay

High-quality hay should be leafy and greenish, but hay varies greatly in quality. A great deal of inferior hay is the result of allowing the material to become too mature, faulty making, or unfavourable weather. Hay which is palatable and of good quality can be made only from green, leafy material which has not run to flower and seed-head, and considerable care must be exercised in the making to preserve the greenness and prevent loss of leaf.

Hay should be regarded as a basic ration for the maintenance of sheep during winter and also, if necessary, during a dry summer and autumn. Its food value is not high and does not compare with that of leafy pasture, greenfeed, or crops; hence its main use is for maintenance rather than for production. It has the advantage of being stored and can be fed out after snow when other feed is covered. Sheep should be introduced to it before midwinter so that if snow falls, they will eat hay because they are already accustomed to it.

Lucerne hay is better than pasture hay because of its higher protein content. Though no tests have been carried out to determine whether this higher protein content is necessarily beneficial, there are theoretical grounds for believing that during winter when grass protein levels are low and when turnips form part of the ration the increased protein content is an advantage.

Red clover hay is comparable to lucerne hay. Subterranean clover hay is even better, as it is less stalky, but conditions are seldom satisfactory for making it.

Chaff

Oat-sheaf chaff has about the same food value as hay and can replace it in the ration, pound for pound. However, as a supplement to be fed with a protein-deficient crop such as turnips it is inferior to lucerne hay, which has a considerably higher protein content. Oat-straw hay (without the grain) is inferior to both lucerne and pasture hay.

Concentrates

Concentrates such as grains, peas, meat meal, linseed meal, and mixed meals are of high food value, but they are too expensive to be used for feeding ordinary flock sheep and are used most in stud flocks. Small quantities of concentrates may be held in reserve for feeding to sick sheep. With the present extraordinarily high prices for wool, feeding concentrates even to flock sheep may, in certain limited circumstances, be on the verge of becoming economic, but other feeds such as pasture, hay, and turnips are so much cheaper that buying hay or grazing would be more economic still.

In experiments at Kirwee the feeding of 1lb. of concentrate per ewe for a month just before lambing or when the feed was drying off in December was not only uneconomic but did not result in the production of better lambs or more wool.

Quantities of Winter Feed Required

Recommendations about the amounts of various crops which should be grown have been suggested from time to time. For instance, 4 tons of hay, 4 acres of greenfeed, and 4 acres of turnips per 100 ewes is a basis commonly mentioned in Canterbury. Obviously, to make such suggestions except in a very general way is risky, for yields vary greatly not only from year to year but also from district to district. Therefore an estimate of the supplementary feed required can be made properly only after consideration of the farm in question.

The greatest contribution which could be made to carrying capacity and the feeding of ewes would be an increase in the acreage of lucerne. The present area in Canterbury is about 20,000 acres, and as some of this is for dairy cattle, the amount available for sheep is probably well below 1 acre per 100 breeding ewes on the plains.

The first advantage of lucerne hay is that it has a very high equivalent carrying capacity per acre, and with modern equipment large quantities can be handled satisfactorily. Second, as it can be stored, it can be fed out when desired or retained for the following year if not required; it can thus act as a powerful buffer helping to smooth out the very large fluctuations in pasture and crop production which occur from season to season.

A reasonable assumption is that a ewe should receive as part of the daily ration about 1lb. of hay for 4 months, including dry autumn periods—roughly equivalent to 2 bales per ewe or 50 to 60 tons per 1000 ewes. This should be the minimum figure, for there may also be hoggets to feed, and some extra lucerne could well be grown to be grazed in autumn. On light land in particular, where summer crops are very unreliable, lucerne could well be grown for fattening weaned lambs and for flushing the ewes. The growing of increased areas of lucerne would enable a reduction in the areas needed for turnips, greenfeed, or other crops.

Another recommendation would be to provide the greenfeed from newly established autumn-sown pasture, either alone or sown with rape or oats, rather than from green cereals alone. If short-rotation ryegrass is included, so much the better. With light controlled grazing in late autumn and winter such pasture can well provide the lambing greenfeed. Further, such a procedure is in line with a policy of constant renewal of run-out pasture. This can also be combined with controlled grazing of paddocks in autumn to provide autumn-saved pasture as greenfeed for late winter and early spring.

Spur Pruning of Fruit Trees

THE cropping ability of fruit trees can be considerably reduced by allowing old fruit spurs to become too abundant. This also has an effect on the quality of the fruit produced. As a direct result growth becomes retarded and stagnant trees occur. By reducing the spurs in a systematic way at pruning time and encouraging fruit development on newer wood, crops and fruit quality can both be improved. The treatment of fruit-bearing wood at pruning time is described in this article by R. I. June, Orchard Instructor, Department of Agriculture, Hastings.

THERE is a tendency, especially among commercial growers, to swing away from an old-established method of pruning which encouraged the retention of old fruiting spurs, many of which were on the leaders or main framework. There is ample proof that this old method has been improved on, as few growers now practise it. There are still some who have not had the opportunity to see the results that can be obtained by modifying their pruning methods.

[R. W. Orr photo.

Winter Cole pear tree branches, which have been thinned, spaced on young wood and showing new wood growth budding up to carry fruit the following season.

Growth and Vigour Stimulated

Over-development of fruit spurs will in time retard the growth of the whole tree. This applies to apples and pears particularly, but may also be the case with plums. The size of the tree does not increase to any extent and peak production is reached while the tree is comparatively young. Because of the reduction in general vigour of the tree, it is often very difficult to establish growth again after it has stagnated in this way.

By systematically pruning spurs to prevent them from becoming too old, new growth will be kept moving in the tree if soil moisture and fertility are attended to and as long as there is ample light. There are many detrimental effects from lack of light through close planting.

By spur pruning, crops will increase over a longer period and peak production is not only higher, but is extended for many years, and may not be reached until the tree is of considerable age. Old fruiting wood can be replaced if a tree is continuing to produce new growth, and actual fruiting wood, particularly spurs, should never be allowed to become too old at any stage in the life of the tree. This of course is the aim of proper pruning, but it cannot be done thoroughly if fruit spur production is allowed to dominate.

Left—A Sturmer apple tree pruned too lightly, leaving too many fruit spurs. Right—The tree with laterals and spurs thinned out.

Tree Balance

Reduction of the number of spurs should be gradual. A heavily spurred tree should not be pruned too drastically in one year, as the loss of crop would be too great. Three years or more may be necessary to eliminate old spurs if the crop is to be maintained at a reasonable level.

A tree which has become stagnant carries most of its leaves on spurs. Too sudden a reduction of spurs must reduce the leafage and therefore the plant food available for fruit production the following year. If maintenance of crop is not important and only the rejuvenation of the tree is desired meantime, more drastic spur reduction can be carried out.

Very little bulk of wood is removed in spur pruning, but a large number of growing points are done away with. This has the tendency to start dormant buds into action, as plant food is diverted to fewer points, which receive extra stimulation, and growth will result. As new growth develops it should be pruned each year, otherwise it also will tend to revert to fruit production with little further wood

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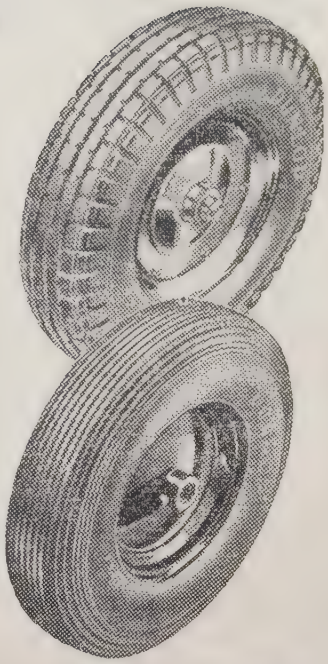

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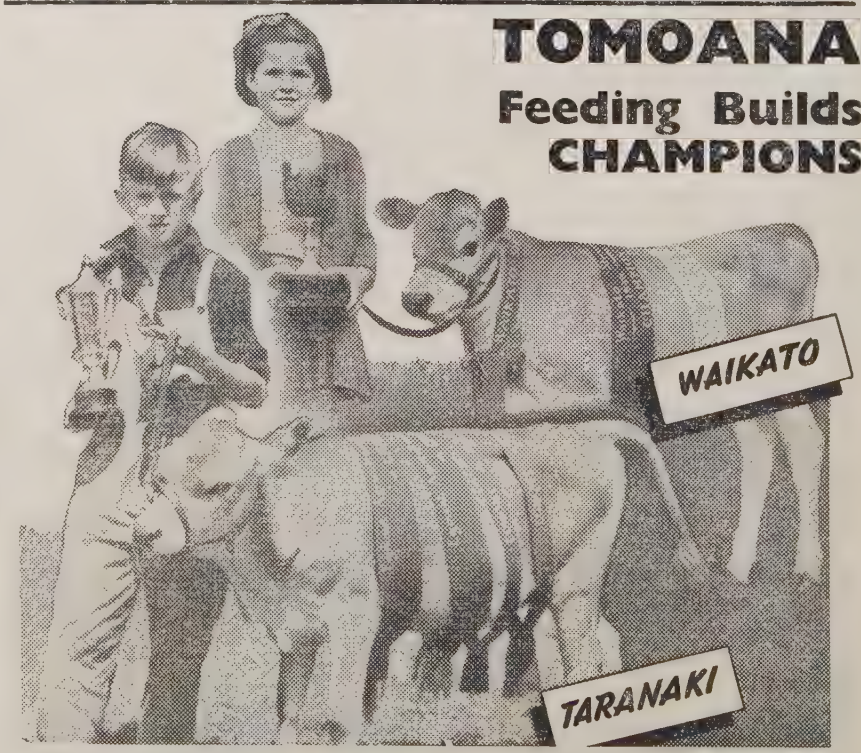

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growth. By cutting back the newly formed wood to about half its length, fruit will develop on only part of the new wood each year. This will gradually increase fruit production and tree size and extend the life of the tree considerably.

Pruning back into heavy wood on leaders or fruiting laterals without attending to spurs seldom induces a stagnant tree to produce new wood to any extent. It may replace the amount cut off, but the tree soon stagnates again. Often no new growth is produced and the size of the tree is reduced instead of being increased. Tree growth may not develop to any extent the first season after spur pruning, but should increase gradually. New growth usually appears in the base of the tree first and gradually extends upward.

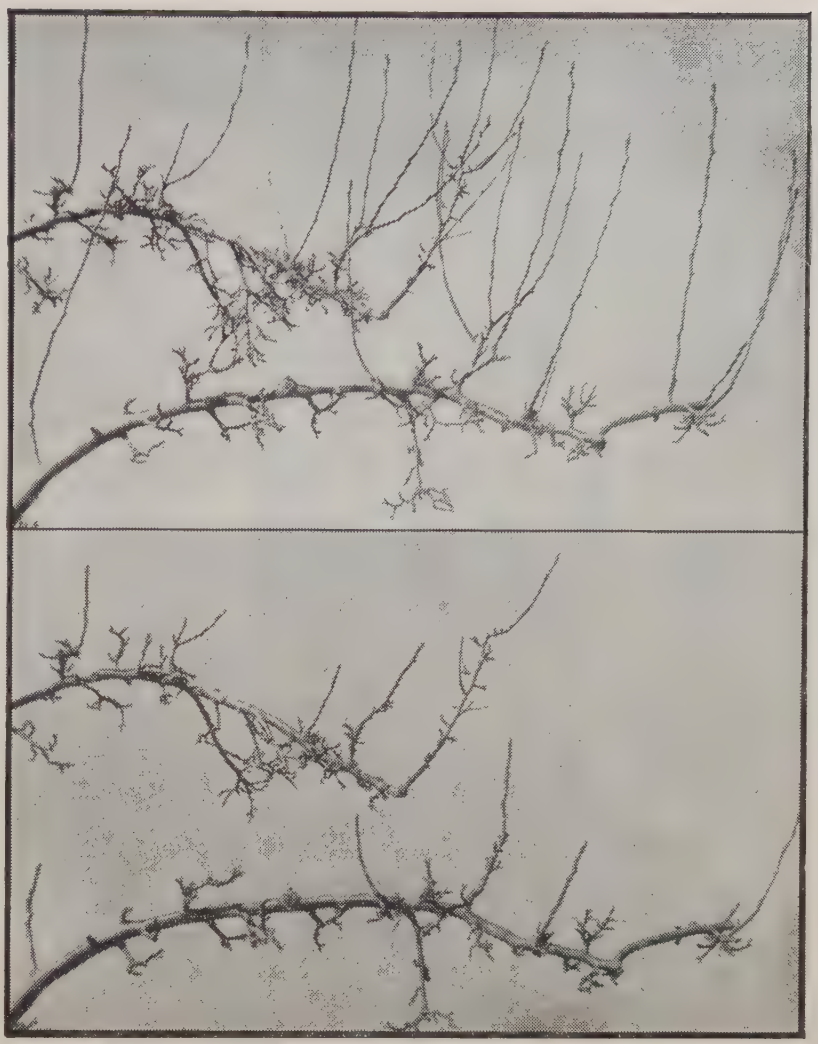
If systematic spur pruning does not produce beneficial results, stagnation is most likely caused by some other trouble such as waterlogging of the roots. A great deal of damage can also be done to root systems by discing too deeply and too close to the bases of the trees, resulting in fairly large roots being cut or at least badly damaged. Once a root of any size is cut it will not extend much again. Usually a lot of fine fibrous roots develop at the cut. When the heavy roots, which help to anchor the tree, are cut, not only is the growth stopped but the tree tends to rock in the wind, which further prevents root development and tree growth. Fertility should be looked to as a cause of stagnation as well as other causes.

Fruit Size and Colour Improved

Preventing fruit spurs from becoming too old and too plentiful will improve fruit size to a marked extent. The sap flow in old, twisted spurs is not likely to be as free as in young ones. Fruit size will become more uniform and there is less likelihood of very small fruit developing.

There is a relation between leaf area and fruit size and colour. From carbon dioxide extracted from the air and the mineral salts and water taken up by the tree roots the leaves manufacture proteins, carbohydrates, and other plant food. These materials are required, among other purposes, for the development of fruit. It therefore follows that the more leaves there are on a tree the greater will be the supply of nutrients to the fruit.

An experiment was carried out some years ago on the relation of leaf area to size, quality, and colour of apples and the size of pears. The experiment was carried out on several varieties, but the results all follow much the same trend. The results on Delicious apples and Winter Nelis pears are set out.



[*R. W. Orr photo.*

Upper—Winter Nelis pear tree branches before pruning. Lower—The same branches after pruning.

[*Green and Hahn Photography Ltd. photo.*

The types of Winter Nelis fruiting wood on the left are undesirable and should be removed in favour of those on the right.

DELICIOUS

No. of leaves per fruit	Size of fruit (Average per bushel case)	Amount of colour
		Per cent.
10	215	55
20	169	55
30	116	80
40	117	74
50	114	63

WINTER NELIS

10	290
20	216
30	183
40	163

The colour of apples improved as the leaf count increased up to a stage and then dropped, indicating that too dense a foliage provided too shaded conditions, preventing the entry of the sun's rays. Size also dropped when leafage became very dense, which emphasises the importance of light to both size and colour.

Other work was done on leaf area in relation to fruit set of pears. The experiment indicated an improved setting of fruit as the number of leaves increased.

A practical lesson was demonstrated in the Hawkes Bay district in 1948 following a serious spur infection of fireblight the previous year in some varieties of apples, particularly Sturmer. Heavy spur pruning was necessary to eliminate the infected spurs. Some growers claimed that the visitation was a blessing in disguise, as the pruning caused the trees to produce new wood for the first time in many years. The crop of course was reduced, but not to the extent expected, as fruit was larger than usual. The value of spur pruning has been realised by growers for many years and crop increases as a result can be substantiated.

Winter Nelis pear trees heavily spurred and producing unsatisfactory and spasmodic crops show an outstanding response to spur pruning. Cropping becomes much steadier and fruit is superior in size and quality. Winter Nelis at one time was being worked over because of its alternate bearing habits. The alteration of pruning methods has now made this variety a popular one to grow. When it was allowed to produce spurs almost at will, far too much blossom was produced, which assimilated too much energy from the tree and resulted in poor blossoming the following year. This has been largely overcome by reducing spurs and producing the fruit on newer wood which can easily be replaced from time to time. Although Winter Nelis is one of the most outstanding examples of this, many other pear varieties respond in a similar way, as do apples and plums. On page 11 a section of a Winter Nelis pear tree is shown before and after pruning.

As previously stated, elimination of spurs should be gradual if fruit production is important. It is not advisable to remove the complete spur by cutting it close to the heavy wood from which it springs, unless the spurs are too close together. Once a spur is completely removed, it is doubtful if growth will spring from the same place. The spur should be shortened, but at least one easily distinguished leaf or flower bud should be retained. By this means some leaves will be produced to draw the sap and keep the spur alive and new growth should develop from the stem or base of the spur.

Spur pruning takes time, but this is more than offset by the advantages of crop increase and cleaner fruit due to better distribution over newer wood which in turn assists spray penetration and coverage. With the improved coverage of sprays, pests and diseases are more easily controlled. More time is usually available during winter, when pruning is the main operation to be carried out.

New Subscription Rates for "Journal"

On and after AUGUST 1, 1951, subscription rates to "The New Zealand Journal of Agriculture" will be:—

New Zealand subscriptions - -	10s. a year, post free
New Zealand school subscriptions	5s. a year, post free
Overseas subscriptions - -	13s. (sterling) a year, post free
New Zealand Forces serving overseas - - - -	10s. (sterling) a year, post free

The above rates will apply also to all subscriptions renewed from the August, 1951, issue of the "Journal".

Existing subscriptions paid at the old rates will not be affected.

For single copies purchased from the Department or from booksellers and newsagents the charge will be 1s. a copy.

Subscriptions for members of Young Farmers' Clubs and Country Girls' Clubs will be increased to 5s. a year as follows:—

School clubs from the January, 1952, issue

Other clubs from the April, 1952, issue

Radio Broadcasts

RADIO broadcasts will be given to farmers from Station 1XH Hamilton at 12.33 p.m. as follows:—

August 2—"Feeding and Rearing of Calves", by P. J. McCann, Veterinarian, Department of Agriculture, Hamilton.

August 9—"Chicken-rearing Methods for the Household Poultry Keeper", by W. L. McIver, Poultry Instructor, Department of Agriculture, Hamilton.

August 16—"Supplementary Crops", by H. M. Bull, Instructor in Agriculture, Department of Agriculture, Hamilton.

August 23—"Farming Problems of New Zealand", by N. Perry, Dominion President, Federated Farmers.

August 30—"Is Agricultural Contracting Necessary for Waikato Farmers?", by K Baxter, W. Moorehead, and P. Harker, members of Kakepuku Young Farmers' Club.

A radio talk will be given to farmers from Station 1YZ Rotorua at 7.15 p.m. as follows:—

August 9—"Potash in Western Bay of Plenty", by A. V. Allo, Instructor in Agriculture, Department of Agriculture, Tauranga.

A talk will be given from Station 3YA Christchurch at 7.15 p.m. as follows:—

August 13—"Why Cream Tests Vary", by J. Cooke, Farm Dairy Instructor, Department of Agriculture, Leeston.

Broadcasts will be given to farmers from Station 4YA Dunedin at 7.30 p.m. as follows:—

August 1—"Hints to Young Beekeepers", by S. Line, Apiary Instructor, Department of Agriculture, Invercargill.

August 15—"Investigations into High-country Problems", by J. M. Hercus, Instructor in Agriculture, Department of Agriculture, Dunedin.

August 29—"Diseases Incidental to Shearing and Marking", by E. A. Pratt, Veterinarian, Department of Agriculture, Oamaru.

Radio talks will be given to farmers from Station 4YZ Invercargill at 7.15 p.m. as follows:—

August 6—"Spring Care of Livestock", by J. P. Anderson, Veterinarian, Department of Agriculture, Invercargill.

August 20—"Grain Growing in Southland", by T. L. Reid, Fields Instructor, Department of Agriculture, Invercargill.

Other talks are given from 1YA Auckland on Tuesdays at 12.35 p.m., 1YD Auckland on Thursdays at 7.30 p.m., 1XN Whangarei on Mondays and Wednesdays at 8.10 p.m., 1XH Hamilton on Mondays at 8.45 p.m., 2YZ Napier on Tuesdays at 7.10 p.m., 2YA Wellington on Thursdays at 12.35 p.m., 3YA Christchurch on Mondays at 12.20 p.m., 4YA Dunedin on Thursdays at 12.35 p.m., and 4YZ Invercargill on Mondays at 12.35 p.m.

Pig Broadcast

Under the auspices of the Otago and Southland District Pig Council a broadcast will be delivered in August as follows:—

Dunedin—4YA and relayed to 4YZ, on August 8, at 7.30 p.m., "Avoiding Losses in Pig Production", by N. Macdonald, Supervisor, Otago and Southland District Pig Council.

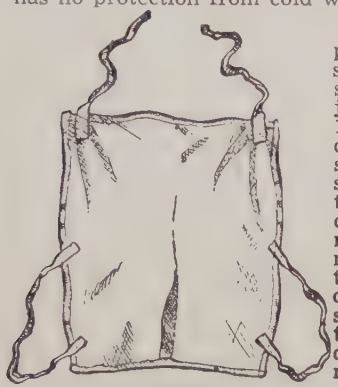
Ewes which Have Bearing Trouble Wanted for Research

A PROJECT for the study of bearing trouble in ewes has been established at the Department of Agriculture Ruakura Hill-country Research Station in the Raglan hills and it is desired to build up the present project flock from 36 to 100 ewes. Farmers within a 50-mile radius of Hamilton are asked to assist the study of the problem by marking any 2-tooth, 4-tooth, 6-tooth, or 4-year-old ewes in their flocks that have bearing trouble in the coming lambing season and offering them to the Ruakura Animal Research Station. Ewes accepted will be paid for at works prices in January and February.

A Cover Can Help a Weak Lamb to Survive

A SIMPLE, cheap, easily applied, yet effective waterproof cover on newly born weak lambs can contribute to the attainment of the highest possible percentage of healthy lambs. The idea is not new, but it is worthy of much wider application in the rearing of lambs, particularly when sheep are bringing record prices and when incomes from wool are very high. The use of the device is described on this page by G. R. Mackintosh, Inspector of Stock, Department of Agriculture, Hamilton.

IN all flocks of average size are born a few sickly-looking lambs which would not survive if some steps were not taken to protect them from cold and wet weather. In years when severe storms occur during the lambing season not only the weakling but many a normal lamb dies because it has no protection from cold winds and rain.



The cover consists of a piece of duck, calico, or similar material cut to various sizes according to the owner's judgment, but usually about 12in. by 10in.; for a Southdown lamb 11in. x 10in. may suffice. It is hemmed at the sides and fitted with straps or tapes similarly to a horse or cow cover. Some farmers make straps of the same material; others prefer elastic tapes. To cause the cover to droop over the rump and tail so that it will fit snugly on the lamb a pleat is sewn down the centre from the middle to the rear.

If the material is not waterproof, it can be made so with any one of the waterproofing preparations on sale. With repeated use and contact with the lambs' wool it becomes rather oily and more waterproof. Each cover is smaller than a handkerchief, and many can be carried in a coat pocket.

When a weak lamb is found in the wet and cold or when stormy weather is expected, a cover can be fitted. The shepherd must then ensure that the lamb gets that important first drink. Should one lamb of a set of twins need protection from the elements, it is wise to place a cover on its twin mate as well to ensure that the ewe will not walk off with an uncovered lamb and leave the weak one.

The cover can be taken off next day if the weather becomes fine, or if necessary it may be left on for 5 or 6 days. Lambs grow very quickly at this stage (particularly, it would seem, when protected from the cold) and the cover should not be left on for too long. A shepherd with a strong-eyed dog, and preferably with a crook or stick also, has no difficulty in catching a lamb to take the cover off.

A cover being fitted on a lamb by the farmer, who is carrying other covers in his pocket.

The use of these covers is probably most suitable on farms where ewes lamb in the nearer paddocks and ewes and lambs are "shedded out" as necessary. Farmers who adopt other methods, however, also find them very useful.

The illustrations show a well-known Waikato sheep farmer, Mr. F. C. Johnstone, who before the adoption of this practice would have taken the ewe and weak lamb to a shed during rough weather. He first used the cover on his stud Southdowns, and it was found to be so much more efficient than the older method that its use was extended to all flocks. Fitting a cover is much easier than taking a ewe with a weak lamb and placing them under a roof. As many as 50 covers have been used in a night on this farm, and the shepherd claims that over a few years he has thus saved hundreds of lambs that would have been lost with the old methods. Men who have used the cover method of protecting lambs have not found that mismothering is any more prevalent than is normal.

Photographs by Fraser Niederer.

Left—A covered lamb with the ewe. Right—The farmer demonstrating a method of catching a lamb to remove the cover. Manuka with distorted growth at the end of a sufficient length of straight stem, or with root growth at a suitable angle to the main stem, may be made into an excellent crook of the type illustrated.

Care of Livestock during August

Contributed by the Animal Research Division

CARE OF THE CALVING COW

COWS about to calve should be brought into a handy paddock so that they can be kept under supervision If a cow has difficulty in calving, veterinary assistance should be sought as soon as it is obvious that the presentation is not normal and in any case within 6 hours of the start of labour. Unskilled interference exhausts the cow and makes the Veterinarian's task more difficult or even impossible. Veterinary assistance should also be sought if the cow does not clean within 48 hours. Do not hang weights on the afterbirth.

FEEDING AFTER CALVING

Autumn-saved pasture is the best food for newly calved cows, but it must be grazed in small breaks which the cows will clean up in about 2 hours. The cows should continue to receive as much silage as they will eat and if the pasture is short and sappy, they should also receive hay.

CALF REARING

Calves should be fed their mothers' milk for the first 3 days. This is important, as the first milk known as colostrum or "beastings" contains substances which increase a calf's resistance to scours. Since overfeeding is an important cause of this trouble, not more than 6 pints daily should be fed during the first week, 7 pints during the second week, and 8 pints during the third week. Diluting the milk ration with a quarter of its volume of water will also reduce the incidence of scours. If scours occur, a supply of a sulpha drug should be obtained from a Veterinarian immediately, as the drug is very effective when used promptly. Calves should not be kept in a calf paddock. When 2 to 3 weeks of age they should be rotationally grazed ahead of the cows. Alternatively, rotate the calves through a minimum of 5 cow paddocks, in which they should spend not more than 5 days at a time in any one paddock.

SELECTION OF CALVES FOR REPLACEMENTS

The full sisters of high-producing heifers should always be kept, as should the daughters of Merit Sires with a high progeny test. Providing they are sturdy, the calves of very old cows with good life-time performances should always be kept, and there is no reason why the calves of well-bred heifers should not be kept. Twin heifers are seldom worth keeping and the twin of a bull calf should never be kept.

MASTITIS

Milk from each quarter should be examined with a strip cup before milking. If it shows any abnormality or if the udder appears inflamed, treatment with penicillin should be started at once. Three tubes should always be injected at 24-hour intervals, even if the milk appears normal after the first tube. Prompt treatment early in lactation will often save a quarter which otherwise might become weak or even blind.

STERILITY IN COWS

If difficulty was experienced in getting cows in calf last summer, now is the time to seek veterinary advice to prevent similar trouble this year. An article on trichomoniasis appeared in the September, 1948, issue of the "Journal". Control of this disease depends on using only clean bulls and not mating cows for several months after calving. It is, therefore, too late to do anything if action is deferred until the mating season starts.

LICE ON CALVES

Calves and yearlings may become very lousy during late winter and early spring. Control can be effected by the use of suitable dips, sprays, or washes, of which those containing D.D.T. or "Gammexane" are most effective. Repeated treatments may be necessary, as the eggs are difficult to destroy.

CARE OF LAMBING EWES

About 10 per cent. of all lambs are either born dead or die during the first week. These losses can be reduced by careful shepherding. Many lambs and some ewes can be saved by skilled assistance during lambing. Always use a reliable lubricating antiseptic on hands and wrists. Faulty presentations must be corrected. A lamb should never be forcibly pulled away when a leg or the head is turned back. A number of lambs die from suffocation through the cleanings remaining over their nostrils. These are very easily removed. Where necessary lambs should be assisted to get a drink. This is particularly important where ewes have very large teats. Drawing away a few squirts from these will reduce their size and enable the new-born lambs to suckle. Ewes with very large teats, very small teats, badly placed teats, or defective udders should be marked for culling. A big percentage of their lambs will die. Many lambs which die during cold or wet weather would survive if they got a good drink soon after birth.

WORMS IN HORSES

Red worms reduce the efficiency of farm horses. Drenching with phenothiazine now will prevent the pastures becoming contaminated with eggs, and thus reduce the chances of reinfestation in spring. As phenothiazine causes very severe reactions in some horses, dosing should be done under veterinary supervision wherever possible. If this cannot be arranged, divide the dose recommended on the package into 5 parts and give it over 5 days.

DISEASES OF CHICKS

Navel disease is contracted in the incubator, which should be scrupulously cleaned and fumigated with formalin between batches of chicks. Pullorum disease can only be controlled by repeated blood testing of all stock, immediate disposal of all reactors, and thorough cleaning and disinfection of premises after each test.

DAIRY PRODUCE GRADED FOR EXPORT

THE following figures showing quantities of dairy produce graded for export during May and for the 10 months ended May 31, 1951, with comparative figures for the same month and 10-monthly period of 1950, have been compiled by the Dairy Division of the Department of Agriculture from figures supplied by divisional officers at the various grading ports:—

BUTTER

Period	Creamery	Tons Whey	Total	% Inc. or dec.	Total tons in store at end of mth.
May, 1951 ..	3,845	153	3,998	—	30,492
May, 1950 ..	2,115	139	2,254	—	14,777
Inc. or dec. ..	+1,730	+14	+1,744	+77.373	+15,715
For 10 mths. to 31/5/51 ..	148,566	3,004	151,570	—	—
For 10 mths. to 31/5/50 ..	140,435	2,864	143,299	—	—
Inc. or dec. ..	+8,131	+140	+8,271	+5.771	—

CHEESE

Period	White	Tons Coloured	Total	% Inc. or dec.	Total tons in store at end of mth.
May, 1951 ..	6,842	—	6,842	—	27,396
May, 1950 ..	4,742	973	5,715	—	20,884
Inc. or dec. ..	+2,100	—973	+1,127	+19.720	+6,512
For 10 mths. to 31/5/51 ..	101,009	1,526	102,535	—	—
For 10 mths. to 31/5/50 ..	77,270	21,509	98,779	—	—
Inc. or dec. ..	+23,739	—19,983	+3,756	+3.802	—

If these figures are converted into butterfat equivalent, there is an increase of 5.295 per cent. in butterfat graded for the 10 months as compared with the corresponding period of the preceding season. It should be noted that the above figures refer only to butter and cheese graded for export, and that owing to diversions which may take place from time to time, they are not necessarily a true indication of production trends.

Management of Cereal and Grass-seed Crops

SEASONAL NOTES CONTRIBUTED
by the EXTENSION DIVISION

WITH unusually wet conditions prevailing in cereal-growing districts weeds have become a major problem in cereal crops during the past few years. Advice on the use of hormone weedkillers in crops follows. The management of pastures for ryegrass and white clover seed production is also covered.

* * *

USE OF HORMONE WEEDKILLERS IN CROPS

Hormone weedkillers form a valuable adjunct to cultivation for the control of weeds in some farm crops. Crops show different degrees of tolerance to hormone weedkillers: Cereals and grasses are resistant; linseed, linen flax, potatoes, and peas are moderately resistant. Linseed should be teated after the crop is over 3in. high, most potato varieties show damage, but recover later, and peas should be treated when past the 4-node stage and then only with a light application of hormone weedkiller. Susceptible crops are brassicas (swedes, turnips, rape, kale, etc.), kumaras, sugar beet, mangolds, and pumpkins. Hormone weedkillers should not be applied to these susceptible crops.

The weedkillers used in New Zealand are M.C.P. and 2, 4-D types. The M.C.P. types and salts of 2, 4-D are more selective than the amines and esters of 2, 4-D, and hence do less damage to crops, but control fewer weed species. The amine salt of 2, 4-D is used widely for the resistant crops, but on no account should an oil-based ester of 2, 4-D be employed, as resulting crop damage will be severe, except for some members of the resistant-crop group.

CONTROLLING WEEDS IN CEREAL CROPS

Weeds affecting cereal crops vary considerably from district to district, but those commonly found in one district or another include wild turnip (*Sinapis arvensis*), fat-hen (*Chenopodium album*), wild tares (*Vicia* spp.), and Californian thistle (*Cirsium arvense*). Experiments have shown that the most satisfactory control of these weeds is obtained by sprays applied when the weeds are young, say, up to 3in. high. When weeds are that size cereal crop plants will frequently be no more than 12in. high and will recover from any spray or wheel damage resulting from weed-control treatment. Very susceptible weeds like wild turnip can be eliminated when treated as late as the flowering stage, but at this late period crop plants are well advanced and are therefore much more susceptible to both spray and mechanical injury, which offsets the advantages otherwise derived from weed treatment. For cereals, water-based or water-soluble hormone weedicides are preferable to oil-based types, as they are less likely to retard or damage these crops.

The normal rate of application for control of mixed weeds in cereal crops is 1lb. of active hormone ingredient per acre diluted in water at solution strengths that vary according to the type of spraying equipment (low- or high-volume) available. Average dilutions would be about 1 in 8 for low- and 1 in 100 for high-volume spraying, the solutions being then applied at the rate of 8 gallons and 100 gallons per acre respectively. Because of the relative tenderness and greater susceptibility of young weeds, economy can be achieved in the use of weedicides by spraying at the recommended stage. With very susceptible weeds such as wild turnip, application rates as low as ¼lb. and ⅜lb. per acre of M.C.P. and 2, 4-D have been found effective. Rates ranging up to 1lb. per acre can be applied without detriment to the yields or quality of grain.

Wheat plot treated with hormone weedkiller (left) and untreated plot (right) infested with wild turnip.

* * *

MANAGEMENT OF PASTURES FOR GRASS SEED

CONTROLLED grazing should be practised on ryegrass seed areas throughout late autumn, winter, and spring. At no time should grazing be severe, concentrated stocking for short grazing periods being desirable to ensure even, vigorous growth of the sward. Avoid heavy, concentrated grazing under cold, wet conditions, particularly on heavy soils subject to poaching and especially on short-rotation ryegrass areas. The period of grazing will vary with local and seasonal conditions, but perennial ryegrass seed areas are usually grazed until mid-October or (at the latest) early November in favourable seasons. Italian ryegrass areas are usually closed in late September or early October. Areas should be evenly grazed or topped at the time of closing. Yields of ryegrass, particularly those of backward stands, will benefit by the application of 1 or 2cwt. per acre of sulphate of ammonia just before or at closing up of the area.

WHITE CLOVER SEED

White clover seed areas should be fairly closely and evenly grazed during autumn and winter to maintain a growth of from ½in. to 1in. Stocking of the area should be eased off toward the end of the grazing period so that the growth is getting away slightly at the time stock are removed. Grazing is usually continued into November until the first flower heads appear. Should excessive foliage growth occur after closing, the crop may be grazed down quickly with a large mob of sheep or checked by topping.

PEST CONTROL ON SEED AREAS

Grass-seed areas are often prone to porina (*Oxycanus*) and grass-grub attacks following harvest. Failure to remove ryegrass straw after harvesting predisposes areas to such attacks. The straw should be baled or stacked for winter feed immediately. Where porina or grass-grub damage appears imminent topdress the area with D.D.T. or "Gammexane" superphosphate at 1cwt. to 1½cwt. per acre.

* * *

SPRING TOPDRESSING OF PASTURES

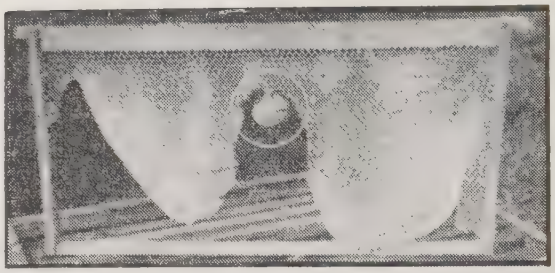
ALTHOUGH it is usual to topdress pastures in autumn, this is often because of convenience, and it should be realised that sometimes topdressing in spring has special advantages. Paddocks which are to be closed for hay or silage can be topdressed to secure a good crop, and this is a necessity where the same paddock has been shut up for several successive years. Where soil fertility conditions are low pastures sown last autumn will benefit from a spring topdressing. In addition, pastures showing signs of deterioration through lack of fertilisers can be topdressed at this time, but only if reasonable amounts of clover still remain in the sward and the pasture has not reached the stage where resowing is advisable.

On high-producing pastures experiments have shown that frequent light applications of fertiliser give greater total production than the same quantity of fertiliser applied as one annual application, and this indicates that topdressing in spring as well as in autumn, using half the usual annual quantity at each dressing, will ensure more efficient use of available fertiliser supplies.

European Wasp: Adaptations to New Zealand Conditions

By C. R. PATERSON, Apiary Instructor, Department of Agriculture, Hamilton, and C. R. THOMAS, Plant Diseases Division, Department of Scientific and Industrial Research, Auckland

SINCE the discovery in 1945 of the European wasp (*Vespula germanica*) in New Zealand, observations have revealed many adaptations by the insect to New Zealand conditions. This article describes some of these features and also an extremely large nest which was discovered recently in the Raglan district.



Initial stage in the establishment of a wasp nest (in circle). This one was started in the centre of a disused bee comb in an empty hive; it was about 1 1/3in. across.

THE European wasp is typically a ground building species. During past years in New Zealand nests were rarely found in other situations. However, during both last season and the present one many nests were established above ground. Nests have been found in hollow logs or hanging under branches. Tiled roofs are a favoured place and many instances have been recorded of wasps building their nests between weatherboards and lining of houses. Indeed there have been several instances of wasps using the fibre of the interior lining to build their nests and eventually breaking through into living rooms.

Nests built in the ground are rarely discovered until the wasp population is so great as to attract attention. Many nests were destroyed this season in their initial stage because the queens had begun to build them in exposed places. A number of tiny nests, only 2in. wide with only 5 or 6 cells started, were found in porches or verandas. Many also were discovered by beekeepers (see illustration above) in empty hives.

Over-wintering Nests

A feature particularly common in New Zealand, but exceptionally rare in other countries, is the presence of over-wintering nests. Normally the virgin queens leave the nest in May, mate with the drones, and then hibernate; the wasps remaining in the nest soon die and the nest is abandoned. However, a number of nests survive in the mild winters of New Zealand and it is the workers from these nests that prove such a nuisance to beekeepers. Although activity is restricted during winter, there is sufficient to maintain the nest, and when the warmer weather of spring approaches the colony rapidly builds up and may continue active until autumn. Consequently with such an extended active period over-wintered nests can grow to considerable dimensions.

Large Kawhia Nest

A nest recently discovered near Kawhia was 8ft. long, 4ft. 9in. wide, and approximately 15ft. in girth. The nest had apparently been started beneath a branch overhung by native creepers. It was well sheltered from the rain and in an area comparatively free from frosts. A close inspection of the nest showed that the papery covering was in some places up to 1ft. thick. This insulation was apparently a natural response to the cold temperatures of the preceding winter.

It is quite possible that this is the largest nest ever recorded, and it is regrettable that it was destroyed before a thorough examination could be made.

Large wasp nest discovered at Makomako on the Raglan-Kawhia road. It was 8ft. long, 4ft. 9in. wide, and 15ft. in girth.

Other nests almost as large have been found in the Raglan district.

Spread of Wasps

Evidence available as a result of inquiries made overseas by the Department of Agriculture and experience gained over the last 5 years in a close study of wasps in New Zealand make it clear that it is practically impossible to eradicate wasps once they become established in a district; nor can their spread be prevented, owing to their habit of nesting in inaccessible places and because of the movement of all kinds of merchandise in which queen wasps may be hibernating. There is evidence of wasps having spread over the greater part of the North Island, particularly in the central bush areas, but so far comparatively few wasps have been seen in the southern part of the island. Several worker wasps have been seen in the Mapua district, Nelson.

Control of Pest

Control of wasps by the employment of Government officers is impracticable. To assist the public, particularly occupiers of properties where there are wasps, the Department of Agriculture continued the free distribution of chemical powder (10 per cent. D.D.T.) this season and also issued a free pamphlet, describing the life history of wasps and methods of control. In addition an insectory is to be established at the Department of Agriculture Soil Research Station, Rukuhia, where research officers of the Plant Diseases Division of the Department of Scientific and Industrial Research, Auckland, will continue their investigations to find some satisfactory attractant for killing foraging wasps and if possible better methods of destroying wasp nests.

Espaliers

By M. G. BAUMGART, Orchard Instructor, Department of Agriculture, Christchurch

TRUE espaliers are an uncommon sight in New Zealand and are too frequently considered only a decorative novelty, although they may be used to provide a large quantity and variety of fruit from a small area of ground, and can be recommended for those with only a small space available for orchard trees. By devoting a little time and attention to training fruit trees along the lines recommended in this article no difficulty should be experienced in establishing trees which not only will give abundant fruit but will be attractive in appearance.

THE term espalier denotes training of trees on any rigid artificial framework, whether a wall, fence, or system of stakes.

The method originated in Europe when in an attempt to enable introduced trees to survive the severe continental winters they were grown against walls which received as much sunlight as possible. The walls stored heat from the sun and released it during the night, giving the trees some protection from severe weather. Pears, peaches, apricots, and figs may still be seen growing along the walls of houses or gardens in European countries. Varied and intricate forms have been evolved, but to make a success of these types some experience of the nature of the fruit tree growth is required, as pruning to train growth must be carried on throughout the growing season as well as in winter.

[*Green and Hahn Photography Ltd. photo.*

There are several straightforward types of espaliers that anyone could grow as a division between flower and vegetable gardens, bordering a path or drive, or alongside a wall. The simplest and most common types are cordons, horizontal types, vertical U types, and fans.

Chief among the points to consider when planning an espalier are the root stock and site.

The root stock (commonly called the stock) is the root system of the tree and usually does not correspond to the variety of fruit the tree will yield, as this variety is budded or grafted on to the stock. Different stocks are recommended for different types of espaliers.

The site will vary according to the section, but a well-drained, fertile soil with adequate shelter but provision for plenty of sunshine is desirable.

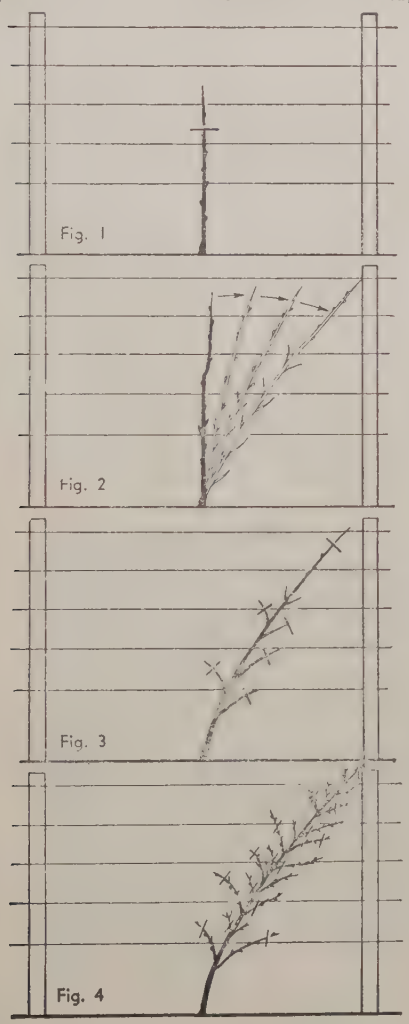
Training of the Various Types

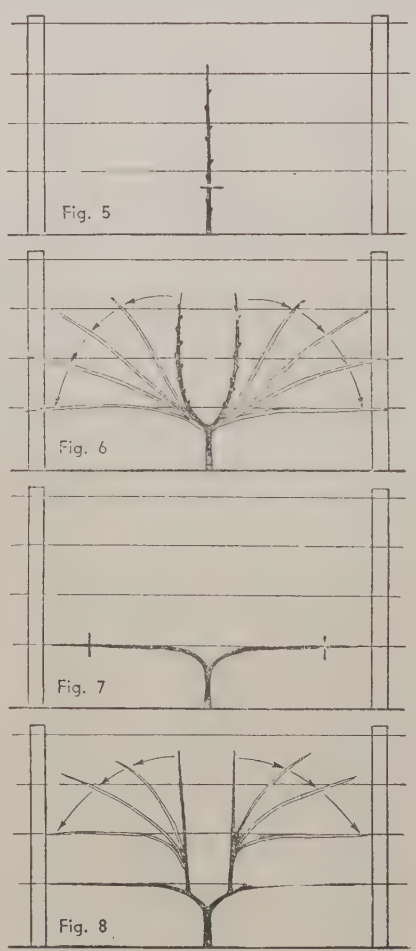
The training of the tree is most important and success or failure largely depends on this part of the work.

Cordons

Cordon trees are a single main branch or stem supported on a fence or wall at an angle of approximately 30 degrees from the vertical. A dwarfing stock is required to prevent the trees from growing too vigorously. East Malling No. IX stock is recommended for apples, quince C for pears. Apples and pears only are normally trained on this system.

A single unbranched rod one year from budding is lightly pruned (Fig. 1) and planted in an upright position. The following spring and summer the resulting shoot is gradually bent down to the 30 degree angle in stages of approximately 10 degrees each month (Fig. 2). The next winter the main branch and all side shoots are lightly pruned (Fig. 3). During the following years the buds at the tips of the shoots (the terminal buds) are pinched out in early summer, when the shoots are from 6in. to 8in. long. This tends to slow down the growth of the tree and to encourage production of fruit buds. In the ensuing years pruning is light, the aim being to produce new growth to replace spent fruiting wood (Fig. 4).





Horizontal Types

Horizontal training is usually adopted for growing trees along a fence or wall and this system is one of the easiest to adopt and most generally satisfactory for apples and pears. A more vigorous stock is required; Northern Spy is recommended for apples, and quince A for pears. A single-rod tree is planted and cut back severely to produce two or more branches (Fig. 5). Next season two of the strongest branches produced are retained, the rest being cut off as near to the main stem as possible to prevent new shoots growing from the wound.

If a branched tree is planted, a year may be saved, in which case the best two branches are retained, the others being removed. The two branches which are retained should be pruned lightly and allowed to grow vertically until the middle of summer; then they are gradually bent down to horizontal, this process being done in several stages, a little each month (Fig. 6).

During the following winter the two horizontal branches are headed back, about a third of their horizontal length being removed (Fig. 7). This pruning forces young growth to break out the following spring along the length of these branches.

During the next spring and summer the two shoots nearest the main stem are allowed to grow unchecked and in late summer are gradually bent down to their positions on the second wire (Fig. 8). All other young twigs have the terminal buds pinched out when about 6in. to 8in. long. This slows down their growth and helps fruit buds to develop along each twig.

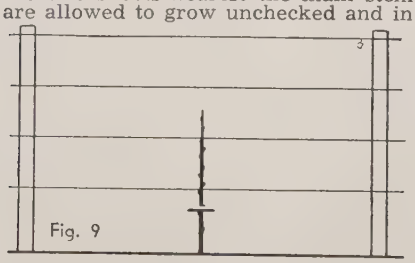


Fig. 9

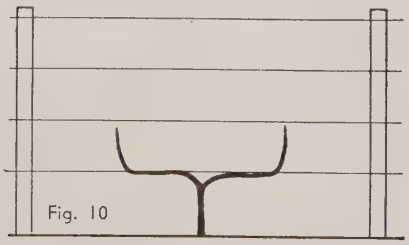


Fig. 10

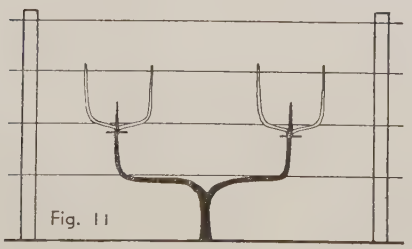


Fig. 11

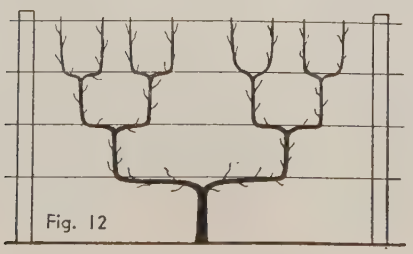


Fig. 12

The next winter all the horizontal branches of the tree are pruned, the upper ones more severely than the lower to produce growth to be trained along the third wire. Side shoots are also pruned, though fairly lightly.

In the spring two shoots are saved and trained along the third wire in a manner similar to that for the second wire. This process continues until all the wires of the fence are filled. From then on all shoots are pinched back during the growing season, to discourage strong growth, and lightly pruned during the winter, when all spent or weak wood is removed.

Vertical U Types

The vertical U method is also recommended for pears when they are worked on quince A stock. Some varieties of pears, notably Williams Bon Chretien and Winter Cole, make a poor union with quince and require double working. That is, another pear variety such as Beurre Hardy is budded on the quince stock and Williams Bon Chretien is then grafted on to the Beurre Hardy. As with the horizontal types the yearling rod to be trained as a vertical U type should be pruned severely (Fig. 9) and two subsequent growths retained for training horizontally along the bottom wire. When these shoots have grown about 2ft. 6in. along the wire the tip of the branch is bent vertically (Fig. 10). When this vertical portion reaches the second wire the terminal bud is pinched out. From this point a very short shoot will develop in late summer, and in winter the shoot should be cut back nearly to its base, leaving it only ¼in. to ¾in. long. In this way several shoots arise the next spring from about the same level. Two of these shoots are retained and are trained horizontally along the second wire for about 1ft. and then turned vertically until they reach the third wire, when the terminal bud is again removed. The resulting short shoot is cut hard in winter (Fig. 11) and two shoots are again retained, trained horizontally for about 6in. along the third wire, and then allowed to grow vertically until midsummer, when the terminal buds of all shoots are removed (Fig. 12). Future winter pruning consists of shortening the vertical shoots slightly, shortening all side shoots to approximately 6in. long, and removing spent fruiting wood. Bamboo or dowelling can be attached to the horizontal wires to support vertical branches.

Fan Types

The fan method is especially suitable for peaches, nectarines, and apricots. The most suitable stock is peach seedling, as it is generally not very vigorous. If a yearling rod is planted, it should be cut back hard to force branching (Fig. 13). If a branched tree is planted, a year may be saved. Of the branches resulting from cutting a yearling rod, three are saved and allowed to grow for the first year, the two stronger ones, each at an angle of 45 degrees from the vertical, one on each side of a weaker one, which is allowed to grow vertically (Fig. 14).

The following winter the three branches are cut hard to increase the number of branches. The following spring each of the three branches will produce several new shoots. Two of these shoots form the six main branches of the fan, all other growth being removed (Fig. 15). During the growing period the terminal buds of the main leaders should be removed, but treatment differs from that of apples and pears in that side shoots are retained to grow unchecked, as they form the fruiting wood for the following year.

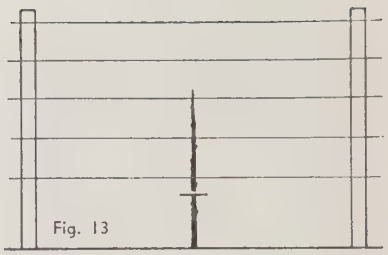


Fig. 13

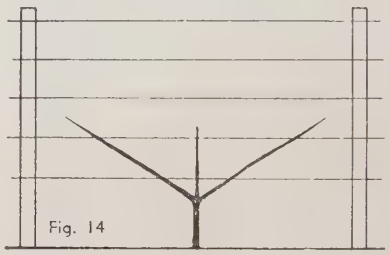


Fig. 14

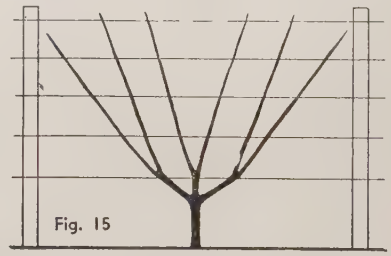


Fig. 15

Each winter thereafter wood that has fruited is cut back to within ¾in. of the main branches and the leaders are cut to below the top wire.

Bamboo or dowelling can be wired to the horizontal wires as supports for the main branches.

Training of Plums

As there is a greater variation in habit of growth and vigour among plum varieties than in most other fruit trees, definite recommendations for training plums are omitted. However, plums worked on peach stock are generally less vigorous than those budded on plum seedlings and are therefore more suitable for espalier training.

The horizontal system of training also tends to reduce vigour and this system is adaptable for many varieties of plums.

Nevertheless, it would be wise when planning to plant plums for growing as espaliers to select varieties which are not very vigorous, such as Burbank, Sultan, and George Wilson of the Japanese varieties and Rivers Early, Early Transparent Gage and Coes Late Red of the English varieties. It should be remembered that English varieties do not crop well in the northern parts of New Zealand.

Growing Crops for Wintering Pigs in 1952

OVER the past 2 years there has been an appreciable increase in breeding sows kept on dairy farms in New Zealand, following the change in emphasis from predominantly baconer production toward a better balance of porkers to baconers. This increased sow herd has to be carried through the winter and, ideally, a large proportion of the sows should farrow during the winter months when there are no dairy by-products available. Supplementary foods are scarce and costly and in this article A. Longwill, Superintendent of the Pig Industry, Department of Agriculture, Wellington, suggests that farmers should grow a small area of crops to provide a basic feed supply and thus get full value from the limited meal supplies obtainable.

IT is not too early now to consider what can be done to provide home-grown crops suitable for pig feeding for use during 1952, particularly for wintering the increased sow herds and store pigs which have to be carried over, but also to safeguard against an early drop in milk supplies in autumn, which makes it difficult to finish second litters as good porkers.

Crops should be selected which suit the district, climate, and soil type and which provide a reserve of food available for use at any time from February through to September. (For details of crops see the table on page 20.) The method of preparation, manurial treatment, time of sowing, and seeding rate to fit in with all the other details should be discussed with the local Fields Instructors of the Department of Agriculture, but if ploughing has not been done already, it should be done as soon as soil conditions are favourable. The more weathering the soil gets on the furrow the better. New Zealand farmers are far too prone to rush in crops without having made adequate preparation and to blame anything but themselves for the poor results.

The aim should be a small area of crop that is well managed and high yielding. As the pig's stomach is not designed to deal with a large bulk of low-quality feed, crops for pigs should be of the higher-food-value types such as sugar beet, fodder beet, pumpkins, maize, or carrots. Where a fairly large area dry enough in winter for pigs to feed on is available artichokes may be grown. Because of the present shortage of meat meal and protein-rich foods generally, peas, which are protein rich, may be chosen in areas where they can be safely harvested, although their yield per acre in terms of starch equivalent does not compare favourably with the other crops already mentioned. It is an advantage to have some concentrate-quality food, and provided such a crop is suited to the district and is given proper attention, it will almost certainly be produced cheaper on the farm than it can be bought.

Cheap Feed the Basis of Profit

The need for cheap pig feed is not peculiar to New Zealand, but here it is the most important factor in making a profit, because of the relatively low prices of pig meats. Many farmers get from pigs returns as high as £6 per cow, and various reasons are cited for such success: Concentration on weaner production; concentration on baconer production; good husbandry; or skilful use of small quantities of grain. Consideration of the circumstances leads to the conclusion that none of these reasons is the prime cause of success; they are merely incidentals, and what all successful pig feeders have in common is that with milk and grain they use cheap, home-grown feed or pastures to the extent of up to half of the total food supply. Grain is usually not cheap in the pig-producing districts of New Zealand, but bulk food such as sugar beet or fodder beet can be grown and fed to pigs for £1 per ton (½d. per food unit).

About 3000 gallons of skimmed milk or 1½ tons of grain is required to feed a sow for a year and to rear two litters (14 pigs) to the weaner stage. To feed the sow and the two litters to the pork stage (90lb. carcass) 4 tons of grain or its equivalent is required. To feed the sow and the two litters to the bacon stage (140lb. carcass) 6 tons of grain or its equivalent is required.

Sugar beet is the most suitable crop for pig feeding. A yield of 30 tons per acre is a fairly modest expectation; crops yielding as high as 70 tons per acre have been grown in New Zealand.

When weaners are £2 10s. per head and pork and bacon are 1s. per pound the gross returns for feed used (milk alone, grain alone, or milk and grain) are about £15 10s. per short ton of grain and about 1¾d. per gallon of milk or approximately £3 5s. per cow on the basis of 450 gallons. This is a theoretical gross maximum. It may be achieved with grain, as grain can be stored until it is required, but cannot be attained with milk because of the uneven distribution of milk by-products over the pig-feeding year.

If half the feed units are replaced by pasture or roots, costs and returns (based on porker production) are somewhat as follows: 4000 gallons of milk (or 2 tons of grain) plus 10 to 20 tons of roots give a gross return of 14 pigs of 90lb. At 1s. per pound for pork these are worth £63. The cost of home-grown fodder depends on whether a high-food value crop like sugar beet or a higher-yielding but lower-food-value crop such as pumpkins is grown, yields, etc. If the cost in the example given is shown as £10, the 4000 gallons of milk (or 2 tons of grain) shows a gross return of £53; that is £26 10s. per ton for grain, over 3d. per gallon for skimmed milk, or £5 15s. per cow. Some may consider it unprofitable to produce roots at 10s.

[*National Publicity Studios photo.*

Maize is one of the crops of high food value recommended for pigs.

per ton for crops like pumpkins, mangolds, swedes, etc. or £1 for sugar beet or forage beet. Nevertheless, to expand pig production by using roots, roots must be available at a cheap rate. If the root crop is unprofitable because of low yield or high production costs, roots cannot be used to enhance profits. Roots may be considered dangerous or unsuitable for pig feed, but those objections are answered by the many pig producers who have had success with them.

Kinds of Cheap Feeds to Grow

The only guide in determining the best source of cheap feed is to compare yields in feed units of various feeds and the cost of obtaining them.

The table below gives feed units per acre for various crops for the yields stated; if the yield per acre shown does not accord with experience on a particular farm, adjustment will have to be made.

Sugar Beet and Fodder Beet

Besides being the most nutritious of the roots suitable for pig feeding sugar beet and fodder beet are capable of yielding much more food in terms of energy value than any others. The crops are useful for all classes of stock and, due to their high sugar content, are reported to be valuable in preventing acetonaemia in dairy cows.

Much of the sugar beet seed which has been raised in New Zealand in recent years has lost its purity, possibly through having become crossed with silver beet. The result is the production of poor, fangy roots and excessive top growth. If seed which has been carefully produced from selected roots is not available, it would be preferable to buy imported fodder beet seed of the Danish Rex variety. This variety grows larger roots than sugar beet and, though it is somewhat lower in food value than the latter, it is higher yielding, which generally means that it produces more food per acre.

Pigs of any size may be fed as much sugar beet or fodder beet as they will eat, and if these roots are supplemented with ½lb. of meat meal per day, even small pigs will make really good growth. Sugar beet and fodder beet do not have to be stored before being fed. In-pig sows will require 2 or 3lb. of meal, including 1lb. of meat meal, according to condition. After they have farrowed the meal allowance may have to be increased while there is no milk available until the ration is about 10lb. per day (in addition to roots).

[*My Bonnie Candid Studios photo.*

The difference between sugar beet crops due to the seed. The roots at left were grown from seed carefully produced for root production; the roots at right were raised from commercial seed which had apparently not been carefully selected or bred, as some crossing with silver beet had occurred.

Use of Meals as Supplements

Winter is the time when it pays to use meals. Even if the meal for a winter litter costs £6 per sow, the cost per pig if 8 pigs are reared will be only 15s. By using this meal pigs get a good start and are ready to go away as baconers about the time sows farrow their second litters. Second litters can be put off in autumn as porkers before the milk supply fails. If second litters have to be carried over, the meal cost could hardly be less than that for rearing winter litters and the total food used per pound of pig meat produced would certainly be greater, due to the unproductive store period, when little weight is put on.

A further argument in favour of early farrowing and rearing the first litter largely with home-grown crops or grass and meals is that good carcass quality can be secured best through quick growth in the litters' early stages, when lean meat is developing rapidly in relation to development of fat. No slowing down in growth rate or check should be allowed to take place, at least until the 120lb. liveweight stage has been reached. Satisfactory growth will be made if first litters farrow in May and June and are kept growing as the food supply improves. The second litters, born in November and December, are then able to get well up to finished porker stage before the declining food supply makes it necessary to use meals and home-grown crops to assist in getting pigs to marketable weights.

Increased Pig Meat Production

As was proved before the war home-grown crops can be used to assist in wintering pigs finished as baconers in the spring months on the flush of milk. Though some pigs can be dealt with in that way, it is more profitable to aim at using the bulk foods for the breeding sows which farrow during winter.

The production of two litters within the dairying season, one reared to bacon weight and one to porker weight, will give the most efficient use of the dairy by-products available, and if sufficient sows are carried to breed pigs in the numbers required to cope fully with the spring flush of milk, it will ensure that the stage is set for maximum pig meat production.

CROPS FOR FEEDING TO PIGS

Crop	When available	Assumed yield per acre			Remarks
		Amount	Starch equivalent lb.	Protein lb.	
Maize (grain)	June onward	60 bushels	2,800	275	See also feed value in stalks
Barley	February onward	40 bushels	1,880	160	Requires moderate rainfall and a dry harvest season
Oats	January onward	40 bushels	960	120	Requires the same conditions as barley
Peas	February onward	30 bushels	1,260	325	Pigs folded on stubble clean up shed peas
Potatoes	April onward	10 tons	4,000	190	Rejects only used for pigs
Artichokes	April onward	10 tons	4,000	160	Crop may stay down for several years if carefully managed, thus reducing cost
Sugar beet	May–September	30 tons	9,960	378	Properly managed these crops grow the maximum food per acre resulting in low cost per unit of food. Highly suitable for pigs
Fodder beet	May–September	40 tons	10,750	400	
Carrots	March–August	25 tons	4,906	331	
Swedes	May–August	45 tons	7,350	700	Excellent crop where diseases, etc., not serious
Mangolds	June–September	60 tons	9,100	540	The crop should be allowed to ripen for 4 to 6 weeks; this crop should not be fed to boars
Lucerne (green)	October–May	15 tons	3,000	750	May be grazed, fed out green, or converted into hay
Pumpkins	March–July	30 tons	5,400	480	May be sown among maize (after scarifying once), when crops are lighter
Chou moellier	February–July	20 tons	3,600	600	Fed off in breaks or carted into pens
Rape	February–March	10 tons	1,550	370	Grazed direct
Thousand-headed kale	February–July	15 tons	2,950	450	Fed off in breaks or carted into pens
Maize stalks (green)	February	15 tons	3,000	235	Frequently used for dairy cows
Pea haulms (unthreshed)					
Green	January	8 tons	1,220	360	Fed in green, succulent state
Dry	April onward	2 tons	800	150	May be fed as hay, allowing pigs to do the threshing

The Home Garden in August

By H. P. THOMAS, Vegetable Instructor, Department of Agriculture, Wanganui

ALTHOUGH the seed of most hardy vegetables can be sown in August in well-drained soil and where outdoor conditions are favourable, there should be no great urgency if there is a doubt about conditions being satisfactory, particularly in southern districts. Where glasshouses are not available frames or cloches can be used for raising plants such as tomato, cucumber, melon, and marrow. Bottom heat, by the use of hot-beds under the frames, is a distinct advantage at this time of year.

IF hot-beds have not been prepared already, they should be prepared from material such as strawy stable manure and leaves, or green vegetable matter and straw.

Land should be cultivated to destroy weeds and to produce seed-bed conditions; shallow cultivation only will be necessary where the ground was well prepared in autumn. Cover crops should be dug under, preferably up to 6 weeks before it is intended to sow seeds.

Early plantings of potatoes should be earthed up and in southern districts seed potatoes set out in trays for sprouting, if that has not already been done.

If desired, rhubarb may be forced by covering some plants with boxes or other receptacles, which should be buried under a good covering of fermenting manure and leaves.

The remains of root crops should be lifted before excessive regrowth is made and the vegetables stored in a cool situation. They should be used as soon as possible, as they will not keep well at this stage.

Planting and Sowing

The state of the ground should be one of the main guides to the advisability of making sowings. Where there is heavy or moderately heavy soil which cannot be worked down to a fine, friable tilth, sowing should be delayed. Soil is usually in suitable condition if it does not stick to the soles of the boots when walked on.

In the well-planned garden of adequate size a considerable area of ground should have been dug or trenched in autumn or winter, depending on whether a green crop was planted or not. As the surface of the ground should have been left rough during winter, it will be necessary before sowing in spring to fork it over lightly to break it down thoroughly and to produce an even surface. Heavy soils may need to be thoroughly loosened and aerated by turning the ground over and breaking the sods with the back of the fork, even though weathering may have broken down the soil to some extent. A light forking is all that is required to bring light soils to a fine tilth suitable for early seed sowing. Whatever the soil the gardener should work backward so that he does not walk on the loosened earth.

Early plants of cucumber, marrow, pumpkin, or melon raised under glass should be sown singly or in pairs in paper or crockery pots to save any check when they are transplanted.

During preparation of the soil in spring opportunity can be taken to apply a dressing of lime and artificial fertiliser. Most vegetable garden soils which have not been dressed for the past year, especially in high-rainfall areas, will benefit from the application of at least 2 to 3oz. of lime per square yard.

Though it should not be applied at the same time as lime, a base dressing of a "complete" or "balanced" fertiliser, one containing nitrogen, potash, and phosphoric acid, could with advantage be lightly forked in over the whole area before sowing is done. If this is done, it will not be necessary to make individual fertiliser applications to crops as they are sown or planted.

The aim should be to sow and plant "little and often" to have crops maturing in as close a succession as is possible throughout the year.

Sowing Seeds under Glass

During August and September, according to the locality, sowing of frost-tender subjects such as tomatoes, cucumbers, marrows, pumpkins, and melons can be made under glass if the home gardener wishes to raise his own plants. The date of the sowing varies according to whether or not heating

REMINDERS FOR AUGUST

Sow: Broad beans, *beetroot (globe varieties), cabbage (summer and autumn), *cauliflower (summer and autumn), *carrots (short varieties), herbs (cress, mustard, and parsley), onion, *peas (dwarf varieties), radish, spring onions, spinach, spinach beet, silver beet, *turnip. Sow under glass for early planting the following: Tomato, capsicum, egg plant, cucumber, melon, marrow, pumpkin, lettuce, kumaras (for shoot production).

* Sow only where outdoor conditions are favourable.

Plant: Asparagus, cabbage (summer), †cauliflower (summer), garlic, †lettuce, onions (autumn sown), †potatoes (few early rows), rhubarb, shallots (complete the planting), silver beet, spinach beet, tomato (in heated or unheated glasshouse).

† Plant only in favourable situations where drainage and soil conditions are good.

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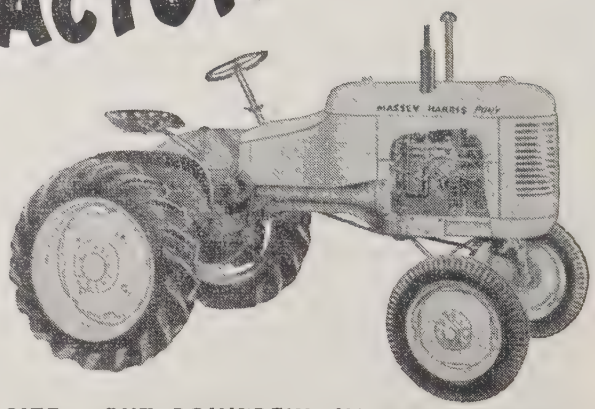

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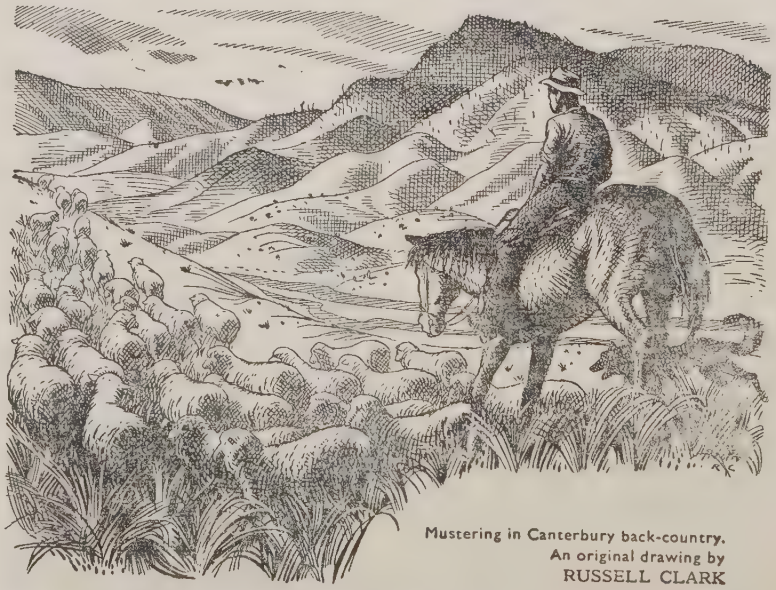

Mustering in Canterbury back-country.
An original drawing by
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is used. In warm localities seed for a main crop may be sown in prepared beds under cloches or a glass frame.

The soil into which seed is to be sown should preferably have been sterilised by steam or formalin during the previous late autumn or early winter.

For the sowing of tomatoes a seedling box is usually used and this should be filled with good, friable soil and gently firmed throughout. After the soil has been levelled the seed may be broadcast thinly and covered lightly with fine soil to which has been added sand to about a third the volume of the soil. The soil should be firmed again, and if the box is situated in a sunny position, it should be covered with a piece of glass and a sheet of paper; the latter must be removed as soon as germination takes place. The seed-box should be placed in the warmest position possible; a glassed-in porch or veranda will suffice if better facilities are not available.

When seedlings are large enough to handle (in about 3½ weeks) they should be pricked out 3in. apart into other boxes. They should be kept for a further fortnight under glass before being hardened off by gradual exposure to outside conditions.

Potentate, Best of All, Beefsteak, and Tatinta Dwarf are some popular varieties of tomatoes.

With cucumbers, marrows, pumpkins, and melons treatment is similar to that for tomatoes, except that seeds are usually sown singly or in pairs in small paper or crockery pots and plants are not pricked out but are grown on and hardened off.

The following is a list of some of the popular varieties:—

Cucumber: Long Green Prickly, Short Green Prickly, and Crystal Apple.

Marrows: Long Green Bush, Long White Bush, and Custard Golden.

Pumpkin: Ironbark, Queensland Blue, and Triamble.

Squash: Warren Squash, Green Hubbard, and Golden Hubbard.

Melon: Many varieties of pie melon, watermelon, and rock melon.

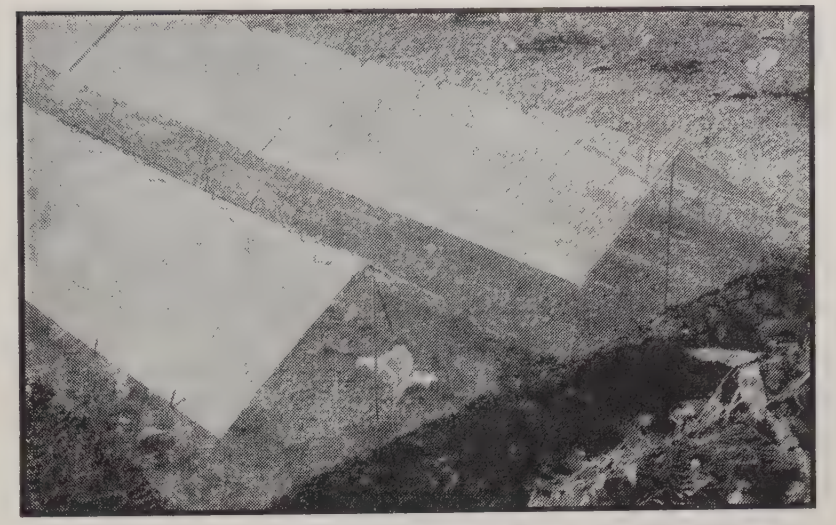
Sowing Outdoors and Planting

Seeds which grow in the open require less exacting conditions than those sown under glass. The first essential in spring is to obtain a fine, reasonably firm, and dry soil for initial and subsequent seed sowings.

When preparing a seed-bed it is preferable to choose a warm day with a drying wind to assist in bringing the soil to the required condition. The area should be given a light forking or hoeing and as this work proceeds the breaking up of persistent lumps of soil should be done. If this work is begun in the morning and conditions are favourable, the soil should be ready for sowing the same afternoon.

Firming of the soil is advocated, but it should not be overdone. If the area has not recently been dug, the firming given by the gardener's feet during preparation of the seed-bed is usually sufficient. When in doubt firm only the light soils which sink slightly when walked on. The firming may be done by walking over the bed with a shuffling motion of the feet.

The final operation in preparing the seed-bed is to rake the surface lightly to remove stones and debris and to give an over-all even surface.



[*Sparrow Industrial Pictures Ltd. photo.*
Where glasshouses are not available frames or cloches can be used in August for raising plants such as tomato, cucumber, melon, pumpkin, and marrow.

Nothing is gained by crowding the rows. By keeping them at satisfactory, regular spacings routine duties such as cultivation, manuring, staking, and spraying can be done conveniently. For setting out rows a measuring rod marked off in feet and 6in. spacings is valuable, particularly when many rows have to be drawn. Alternatively garden-line pegs, which preferably should be 2ft. long, would serve.

All seed drills should if possible run north and south, as this not only gives a neater appearance but allows for convenient working and the crops get the maximum of sunshine.

Sowing depth: Seed like beet and parsnip can be sown about ½in. deep, peas about 2in., and large seed like broad beans 2 to 3in. The swan-necked hoe is probably the most convenient tool for making drills for the larger seeds such as peas and beans.

Though a corner of a hoe or rake can be used to make the drills for small seeds such as carrot and lettuce, the end of the handle is equally effective and disturbs the soil less. It will give a firm, rounded drill, and small seeds are not likely to be washed down deeper into the soil by the first heavy rain. The maintenance of correct, even depth in drills is very important, because variations are likely to cause irregularity in germination and growth.

It is a good plan, particularly in hot, dry weather, to make drills a little deeper than required and not to fill them in completely after sowing. In this way the position of the seed drill is marked, any water received is retained, and later earthing up (necessary in many cases) can be done more conveniently.

Short, repeated strokes should be used when drawing a drill, so that the depth and straightness can be regulated more easily. If a long continuous stroke is used, it is more difficult to keep the drill straight and the depth even.

Sowing: The aim in sowing seed should be to distribute the seed evenly. Seed should not be sown thickly, as this not only wastes seed but increases the work of thinning and produces weak plants through over-crowding. A method which appears to have distinct advantages is to sow a pinch of seeds at the recommended spacings given for final maturity, and if germination is good, to thin each group of seedlings to one plant. This would possibly save seed and much work in thinning.

After sowing, the soil should be raked carefully over the seeds with the back of the rake, leaving the surface level. The soil, particularly if it is light, should be tamped down with the rake head to make sure that the soil is in close contact with the seed. Care must be taken that this tamping is not overdone.

It is preferable to sow on a calm day after rain rather than before it, as a hard crust often forms after rain and this may retard germination. When rain follows seed sowing it is necessary to wait until the soil is fairly dry and then to beat the crust gently with the back of a rake and cultivate lightly between rows.

To facilitate germination in very fine soil which is liable to crack (and which apparently lacks humus), a little coarse sand can be placed below and above the seeds.

If conditions are dry, it is an advantage to run the watering can along the drill to soak the soil with which the seed will come in contact, but watering should be done some hours before sowing is begun.

Seed failures can often be attributed to one or several of the following causes:—

1. Sowing too early.

2. Sowing too deeply or too shallowly.

3. Sowing in soil that is lumpy.

4. Sowing in soil that is too dry or too damp and heavy.

Rows can be labelled with proper pegs and marked with indelible pencil or better marked down on a plan of the garden. The practice of putting the seed packet into a split stick gives

[Green and Hahn Photography Ltd. photo.
It is often advisable when sowing seed to step on pieces of wood to avoid over-firming the seed-bed. The flow of seed into the drill can sometimes be improved by sowing from a slip of paper folded to form a V.

the garden an untidy appearance, and the packet may become disfigured or be displaced.

Thinning: Plants should be thinned as soon as they are large enough to handle. Much tedious thinning can be avoided and plants will not be weak and drawn if care is taken when sowing seed.

Transplanting: Plants should not remain too long in the seedling rows, beds, or boxes, because they will become drawn and weakened, and the check may prevent them from maturing correctly. When seedlings are 2 to 3in. high they may be set out in the open, providing they have been hardened off if grown under glass; stocky plants should be chosen and given ample spacing so that they develop properly and maintenance work can be done conveniently.

Planting should be done with a trowel or dibble, the latter being used for leeks and brassicas, which when young have few fibrous roots. Plants having good roots with a ball of soil attached should be planted with a trowel. The hole made with the trowel should allow the roots to go into it without being doubled up. The soil round each plant should be firmed so that the roots are in close contact with the soil and there are no large air pockets.

Transplanting should if possible be done in cool, cloudy weather during late afternoon or early morning. Hot or windy weather causes severe loss of plant moisture and consequent wilting. When the weather is dry a watering after planting will assist in settling plants in their new positions.

Asparagus

Asparagus beds may be established during August in most northern districts, but in parts of the South Island September is preferred because soil and climatic conditions are more suitable then.

Broad Beans

A sowing of broad beans can still be made to provide supplies for summer, though a crop sown at this time is more likely to be affected by aphis attack, rust infection, and damage to flowers by certain bumble bees than crops sown earlier. However, where this vegetable is appreciated it is usually worth taking the risks involved. Aphides can be controlled by spraying with nicotine sulphate 1 : 800 (5 teaspoons to 4 gallons of water plus 2oz. of soft soap if the nicotine is not combined with another spray).

Where rust is likely to appear the crop should be sprayed at 14- to 18-day intervals with lime sulphur at 4½ fl. oz. plus 1¼oz. of colloidal sulphur to 4 gallons of water. Though it is not necessary usually to begin spraying until the plants are forming flower pods, the aim should be to prevent the disease rather than to cure it.

The soil for broad beans should be deeply dug and fairly well supplied with organic material, preferably that added for an earlier crop. If additional plant food is required, a dressing of up to 3oz. of superphosphate per square yard should give good results. Beans should be sown in zig-zag pattern in double rows with the seed 4 to 6in. apart and 2in. deep. Broad beans should not be grown too thickly or in a shady position.

Varieties: Early Long Pod and Broad Windsor.

Cabbage and Cauliflower

Seedlings of the quicker-maturing varieties of cabbage such as Flower of Spring or Golden Acre and of cauliflower such as Early London and All Seasons when of sufficient size for transplanting may be set out during August if conditions are favourable. If good plants are set out, they should be ready for use from November to December.

A further sowing of the varieties of cabbage and cauliflower already mentioned may be made now or a succession may be arranged by sowing varieties with different maturity periods. For instance, Golden Acre, Copenhagen Market, and Henderson's Succession cabbage and Early London, Phenomenal (5 Months), and Phenomenal Main Crop cauliflower sown in August and September will give the succession desired through summer and autumn.

The seed-bed for cabbage and cauliflower should be well drained and broken down to a very fine tilth. Seed should be sown thinly ¼ to ½in. deep, preferably in rows to facilitate weeding and cultivation.

Manure

Manure applied to the seed-bed will give seedlings a good start, but as germinating seed may rot if it comes in contact with manure, only a small amount should be applied and it should be thoroughly incorporated.

Ground where cabbages and cauliflowers are to be planted out should be deeply cultivated and liberally enriched with stable manure. Where this is not available a mixture of 2 parts of blood and bone and 1 part of superphosphate applied at the rate of ¼lb. a square yard is a good substitute.

Peas

In the warmer parts of the North Island sowings of peas will have been made already, and provided conditions are favourable, further sowings can now be made in most districts. Nothing will be gained, however, if seed is sown in cold, wet ground or during wet weather.

The ground should have been deeply dug and manured, preferably in autumn, with organic material such as stack bottom, compost, or farmyard manure. For early crops and where little organic material is available a mixture of 3 parts of superphosphate, 1 part of blood and bone, and 1/20 part of sulphate of potash, all by weight, applied at the rate of 8oz. to 9ft. of row and thoroughly worked into the soil a few days before sowing should improve yield.

To maintain a succession it is advisable to make sowings of peas at intervals of about 3 to 4 weeks of varieties with similar maturity periods or to sow at the same time several varieties that will mature in succession.

Seeds should be sown 1 to 2in. apart in broad, flat drills which can be drawn out with the hoe 18 to 30in. apart according to the height of the variety. Drills should be 2 to 3in. deep, except where conditions are hot and dry, when they should be considerably deeper. Although deeper cultivation is advocated in hot and dry conditions, seed should never be covered by more than 1½ to 2in. of soil. However, when drills are deeper the roots can develop in cooler and moister layers of soil than when seed is sown in the shallower drills.

Varieties: Early varieties include William Massey, Blue Bantam, Little Marvel, and Earlicrop. To secure a succession William Massey, Onward, and Stratagem, which mature in that order, may be sown at the same time.

Potatoes

It is advisable in most districts to refrain from making extensive plantings of potatoes until September, and in many districts it is advisable to wait until October before planting the main crop. In northern districts, however, small plantings for an early crop could be made in August if a warm, sheltered border is available. Very

[Green and Hahn Photography Ltd. photos.

Two methods of sowing broad beans. The seed should be sown 6in. apart and 2 to 3in. deep in double rows 10in. apart.

early planting does not always result in correspondingly early maturity. If tubers planted very early are set deeply, they usually respond slowly because of the colder ground temperatures. If planted shallowly they must be earthed up regularly to protect them from frost.

Early varieties: Epicure is very popular, but Jersey Bennes and Cliff's Kidney are also favoured. Where space permits it is a good plan to test several varieties.

Salad Vegetables

Salad vegetables such as lettuces, radishes, and spring onions may be sown in August where ground conditions are favourable. Small successional sowings are advised, as these vegetables remain in the best condition for only a short time. They should be used when young and fresh.

A well-drained, well-cultivated soil rich in organic material is necessary for salad crops, as quick, vigorous growth is essential if they are to be crisp and succulent. Soil for lettuce in particular should be well supplied with nitrogenous manure such as dried blood, blood and bone, or poultry manure. If these manures have been omitted or are in short supply, applications of liquid animal manure or artificial fertilisers, preferably in liquid form, are satisfactory substitutes. Sulphate of ammonia or nitrate of soda at the rate of 1oz. to 4 gallons of water can be applied particularly when the heads are forming.

Seed of radishes, spring onions, and lettuces should be sown thinly ¼ to ½in. deep in rows 12in. apart. Lettuces can be thinned to 8in. apart when plants are well through the ground. Alternatively, lettuces may be sown in boxes in a frame or under cloches and planted out when 2 to 3in. high.

Varieties for sowing and planting now are:—

Lettuce: Neapolitan, Imperial 615, and Webbs Wonderful.

Radish: Mixed Turnip and French Breakfast.

Spring Onion: White Lisbon, Silver Skin, and Odourless.

Onions

The production of main-crop onions from autumn-sown seed is confined mainly to the North Island, and where ground is in suitable condition plants may be set out in August. In the South Island it is customary to grow such crops without thinning them for use in December and January. These crops should have continual light cultivation during this long period to encourage strong, sturdy growth.

Where onions are to be transplanted, early preparation of the onion bed is desirable, as it allows for consolidation of the soil, a condition necessary for good growth in onions. The area for onions should have been deeply dug and well supplied with organic matter in autumn. Liming may be necessary, as the onion is very sensitive to excessive soil acidity. In most districts an annual dressing of 4oz. per square yard should be sufficient, although the quantity could be reduced in districts with a low rainfall. Phosphates are essential for onion culture and potash should also be supplied. A dressing of 3 parts of bonedust, 2 parts of superphosphate, and 1 part of sulphate of potash, all by weight, should be applied at 4oz. per square yard before planting and be well worked into the topsoil. Although it is necessary to use slow-acting fertilisers if long-keeping bulbs are desired, two dressings of nitrate of soda applied 4 to 6 weeks after planting will stimulate early growth. The nitrate of soda may be applied in liquid form, 1oz. to 4 gallons of water, or sprinkled lightly along the plant rows and carefully worked in.

Setting the plants deeply in the soil is not recommended. Tops and roots should be trimmed, and the roots then covered lightly or pressed straight down into the bed. In a very short time roots will hold plants upright. Plants may be set out 4 to 6in. apart in rows 12 to 15in. apart.

Spring Sowing

An early-spring sowing can be made in most districts if ground conditions are favourable, but in the south the ground usually is not warm enough for sowing of the main crop until September. In preparation for sowing the main crop the ground should be kept surface cultivated but otherwise firm. The fertiliser mixture given for plants will be suitable for the seedbed, but it should be distributed several weeks before seed is sown. A dusting of lime, wood ash, and soot will also be found beneficial. Seed should be sown ½in. deep in rows 12 to 15in. apart.

Varieties: Pukekohe Long Keeper, Brown and Straw Spanish, and Turbot are good keeping varieties, but for early use Ailsa Craig, and Giant Rocca can be grown.

Silver Beet, Spinach Beet, Spinach, New Zealand Spinach

Silver beet and spinach beet are comparatively quick-maturing vegetables and are among the first of the new season's crops to mature. Under favourable conditions they should be ready for the first cutting in approximately 2 months from seed sowing. They do well in the cool soils of early spring provided drainage is good and the soil is rich in well-decayed organic material. Both species transplant well at this time of year, and if young

plants are available from earlier sowings, rows can be thinned to leave plants 8in. apart and the best of the plants removed can be replanted in rows 18in. apart. Liquid manure may be given later to produce the crisp, succulent growth desirable.

Where conditions are favourable seed of silver beet or spinach beet can now be sown ¼ to ½in. deep in rows 18 to 24in. apart. Where outdoor conditions are not considered suitable seed may be sown in a box of prepared soil and the plants grown on in a frame for hardening off and setting out when the weather is more settled.

Spinach

A spring sowing of the round-seeded or summer spinach may now be made in soil which previously has been well manured and limed. Quick growth is necessary to produce tender, succulent leaves. A fertiliser composed of 3 parts of superphosphate and 1 part of sulphate of ammonia by weight applied at the rate of 2 to 3oz. per square yard should provide this stimulus.

Seed should be sown ½ to 1in. deep in rows 12 to 15in. apart and plants thinned later to 4in. apart.

Round Summer is a good variety.

New Zealand Spinach

A sowing may now be made of New Zealand spinach, which though it is not a true spinach, is considered by many to be a valuable substitute and some prefer it to ordinary spinach. As the plant has a spreading habit, a few plants will be sufficient for the average garden.

New Zealand spinach does well where conditions are too hot and dry for ordinary spinach, which is another point in its favour. It is not difficult to grow, but it thrives in a rich, well-worked soil which has previously received a dressing of lime. Seeds of New Zealand spinach should be sown 1 to 1½in. deep, depending on whether the soil is heavy or light, in groups of 3, and the groups should be at least 2ft. apart each way. When the plants have become established each group should be thinned to one strong plant, because of the plant's spreading habit. As germination is often slow, it will be of benefit if the seed is soaked in water for 12 hours before it is planted.

Varieties

Silver beet: Lucullus, Fordhook Giant, and Dark Green Broad Ribbed.

Spinach beet: Perpetual Spinach and Spinach Beet.

Root Crops

As soon as soil and weather conditions are favourable small sowings of carrot, turnip, beetroot, and parsnip can be made, though most home gardeners grow parsnips for late-autumn and winter use only, sowings being made in October, November, or even December.

The soil for root crops should be rich in well-rotted organic material applied for a last season's crop. Cultivation should be deep and thorough, and good drainage is essential. If the soil requires manure, blood and bone mixed with twice its weight of superphosphate should be broadcast at the rate of 3oz. a square yard during preparation of the ground.

Seed of carrot, turnip, beetroot, and parsnip should be sown ¼ to ½in. deep, and seedlings of the last three thinned 4 to 6in. apart. Carrots, if sown sparingly, may be left and the thinning done when the young roots are large enough for soups and stews.

Suitable varieties are:—

Carrot: Early Horn, Early Krop, and Chantenay.

Beetroot: Detroit Dark Red, Obelisk, and Egyptian Turnip Rooted.

Turnip: White Stone, Snow Ball, and Orange Jelly (Golden Ball).

Parsnip: Hollow Crown or the turnip-rooted variety which is early maturing.

Parsley

To ensure adequate supplies of parsley it is advisable in most gardens to sow seed twice a year—during spring and in autumn; for summer and autumn supply a sowing may be made now.

Parsley thrives in any good garden soil, although it is necessary for best results to provide a rich, well-drained soil. Where the soil is lacking in organic matter a dressing of blood and bone worked lightly into the soil at the rate of 2 to 3oz. per square yard usually gives good results.

Seeds can be soaked for a few hours in warm water before being sown, particularly if the soil is dry. This treatment is recommended because the seed germinates slowly, sometimes taking 4 to 6 weeks to come up. For this reason some gardeners prefer to sow the seed in boxes and transplant later. In the garden seed should be sown ¼in. deep, preferably in a row, and the plants should be thinned later to 8in. apart if that is necessary.

The outer and larger leaves should be removed successively from several plants in preference to stripping one plant. This will induce the plants to continue producing good-quality leaves for several months.

The period over which plants will yield can be prolonged by cutting off the seed stalks as they appear. Parsley must be kept watered if dry conditions prevail.

Varieties: Extra Moss Curled and Treble Curled are most popular.

DISMOUNTING from moving wheeled or track-laying tractors is courting danger, though operators may believe they can escape accidents.

Some wheeled tractors allow easy dismounting to the rear, but others have little space for this purpose because of modern attachments. Difficulties are increased if large coats are worn. A coat may catch on an adjustment lever, which can easily result in a land wheel, a tine, or a disc catching a foot, to start off a chain of circumstances from which there is little chance of avoiding injury.

[Campbell Photography photo.

Moving track-laying tractors are even more dangerous to mount or dismount because the driver must pass over or close to moving parts. The smaller illustration shows an operator's foot which was caught in a rear driving sprocket—an accident which was nearly fatal. Tracks open and close (as indicated by the arrow on the larger illustration) when they move round the driving sprockets or front idlers. Portions of clothing can enter these openings, which as the tractor moves close so firmly that escape is impossible.

When gates have to be opened on a downhill grade the driver should ensure that the brakes are locked in the "on" position, as a tractor, and especially a wheeled model, can creep up and crush the driver. In no circumstances should the driver throttle back, jump off, and run ahead of the tractor to open a gate, as in the illustration.

—J. N. M. WHYTE,
Farm Machinery Instructor,
Department of Agriculture,
Dunedin

POISONOUS PLANTS IN NEW ZEALAND

THIS is the tenth section of a series of descriptions of poisonous plants which grow in New Zealand by H. E. Connor, Botanist, Department of Scientific and Industrial Research, Wellington. The series is appearing monthly in the "Journal", and glossaries to be used with the series were published with the first section, which appeared in the October, 1950, issue.

DICOTYLEDONS

Scrophulariaceae

Foxglove. *Digitalis purpurea* **L.**
(Fig. 21)

Botanical description: Habit—Biennial herb with simple, erect stems up to 3ft. or more tall. **Leaves**—Alternate, ovate to ovate-lanceolate. **Flowers**—In long, nodding racemes on long flower stalks; purple or white and intermediate colours. (Europe.)

Habitat: Waste places and bush-burn pastures.

Distribution: Frequent to locally abundant in both islands.

General: Foxglove is known to be poisonous to stock but rarely appears to be responsible for livestock losses in the field, though in the United States of America horses and cattle are recorded as having been poisoned by eating the leaves. From observations in New Zealand it seems that animals never eat foxglove even when fodder is extremely scarce. Foxglove is not made innocuous by drying, so the occasional inclusion of seeding plants in hay may cause sickness and death in stock, as it has done. Feeding trials at the Animal Research Station, Wallaceville, confirm the cumulative poisoning effect of foxglove. All parts of foxglove plants are poisonous, but the seeds are said to be especially so. The toxicity of the leaves is said to be greatest at the start of flowering.

Symptoms of poisoning: Foxglove has a pronounced effect on the action of the heart. The general symptoms resulting from large doses are gastro-intestinal irritation, diarrhoea, loss of appetite, nausea, slow but stronger pulse, and contracted pupils.

Poisonous principle: The glycosides in foxglove are the toxins.

Fig. 21—Foxglove (*Digitalis purpurea*).

Myoporaceae

Ngaio. *Myoporum laetum* **Forst. f.**
(Fig. 22)

Botanical description: Habit—Shrub or small tree 8 to 25ft. tall; trunk 9 to 18in. in diameter; branches, viscid at the tips. **Leaves**—1¼ to 4in. long, lanceolate to oblong-lanceolate or obovate, sharply pointed, bright green, quite glabrous, almost fleshy, studded with glands. **Flowers**—In axillary bundles of 2 to 6, about ½in. in diameter, white spotted with purple. **Fruit**—Drupe, oblong, succulent, reddish purple. (New Zealand.)

Habitat: Mostly coastal but often inland.

Distribution: Not uncommon in lowland districts as far south as Otago.

General: Each year ngaio takes its toll of livestock in New Zealand. An example of a severe loss occurred in July, 1945, when 73 head of cattle were fatally poisoned by ngaio on Banks Peninsula. Though deaths are more common in cattle, pigs have been poisoned on one occasion and a suspected ngaio poisoning of a horse is recorded. Ngaio poisonings are to be expected only after branches or trees have been blown down during storms or broken down by heavy falls of snow, as in the Banks Peninsula poisoning, because normally the plant is not accessible to livestock. The leaves seem to be the most toxic part of the plant, the berries being less toxic, though in a reported case of poisoning a very large number of fruits had been eaten and were held responsible for the loss of Hereford steers. One farmer reported abortion in cows which had eaten sublethal quantities of ngaio leaves. Experimental work at the Animal Research Station, Wallaceville, has shown that ngaio is toxic to sheep.

Symptoms of poisoning in cattle: Field observations of sublethal cases showed the head much swollen; from the top of the shoulders back toward the tail the skin swelled, broke, dried, and fell off in quite large pieces. Antemortem symptoms were severe constipation, abdominal pain, and the passing of a small quantity of hard, dry, blood-stained faeces. Dullness, loss of appetite, no rumination, and in some cases icteric discoloration of the conjunctiva are other symptoms. The skin on the teats and udder may be swollen, tender, and often severely cracked, peeling off after several days in non-fatal cases. The skin on the muzzle and on other parts of the body becomes dry and scaly. Post-mortem examination shows impaction and intense inflammation of the fourth stomach, considerable hemorrhage from the mucous lining of the stomach, intestines inflamed and hemorrhagic but relatively empty, and intensely inflamed rectum, impacted with a small quantity of hard faeces. Deep golden-orange urine is present in the bladder.

Symptoms of poisoning in sheep: Non-lethal doses administered experimentally to sheep caused depression and loss of appetite, persisting for a time. Acute photosensitisation occurred in sheep exposed to sunlight. Oedematous swelling of ears and face eventually subsided and passed through to the ultimate formation of dry scabs over the ears and other exposed portions of the skin. Death from lethal doses was preceded by dullness and loss of appetite. Post-mortem examination showed a considerable accumulation of yellow peritoneal fluid, congested liver, generalised icterus, and deep yellow urine. The fourth stomach and small intestine were congested with blood, inflamed, and spotted with pin-point hemorrhages. The contents of the rectum were hard and dry.

Poisonous principle: An essential oil with poisonous properties is present in the leaves of ngaio.

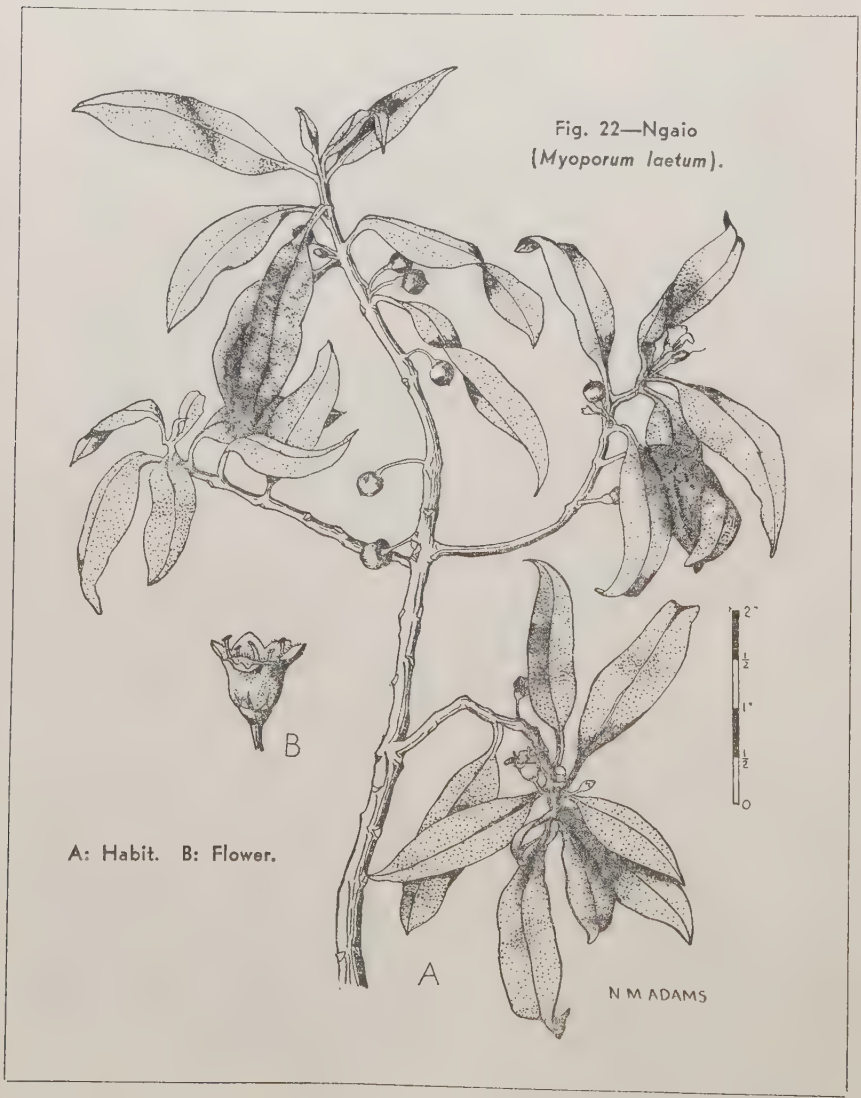


Fig. 22—Ngaio (*Myoporum laetum*).

Protection Provided to Users by Certification of Plant Therapeutants

THE necessity for assessing the value of the many sprays, dusts, and fumigants — collectively termed therapeutants—placed on the New Zealand market has been shown by work on the improvement of methods for combating bacterial, fungous, and insect diseases and pests of plants carried out by the Plant Diseases Division, Department of Scientific and Industrial Research. Quite half of the therapeutants tested in past years have been shown to be ineffectual for the purpose for which they were sold. Therefore, orchardists, nurserymen, and farmers need some simple means of ensuring that they buy only efficient materials.

To this end the Plant Diseases Division has introduced the certification of therapeutants, operated on the following lines:—

The manufacturer of the therapeutant, or his agent, offers to the Division for certification samples of the product he wishes to market in New Zealand. Accompanying his application are particulars of its composition, methods of analysis (where necessary), and evidence of its worthiness to be tested. Such information is treated as confidential by the Division. Details are given in Plant Diseases Division Form No. 1, "Certification of Therapeutants", which may be obtained from the Director, Plant Diseases Division, Private Bag, Auckland.

Laboratory and Field Tests

The product is then tested in the laboratory and field under rigorously controlled conditions. Tests are mainly biological though chemical or physical analyses are made to check the composition of different samples of the same product. In addition the most efficient concentrations at which the product is safe to apply to plants and yet will give most effectual control of diseases or pests are ascertained.

If the therapeutant passes the tests imposed, it is certified and the manufacturer, or his agent, supplied with a warrant of certification. This is to be incorporated in or on the label of the product, as it bears the registered trade mark and the purposes for and concentrations at which it may be used. The product is also listed in certification lists published in July and January of each year and distributed to all users of therapeutants on a commercial scale.

Orchardists, nurserymen, and farmers may therefore buy any certified product with the knowledge that it is efficient for the purpose for which it is offered for sale in the Dominion. Copies of lists of certified products may be obtained from Dr. H. Jacks, Plant Diseases Division, Private Bag, Auckland.

—*G. H. CUNNINGHAM, Director, Plant Diseases Division, Department of Scientific and Industrial Research, Auckland*

Value of Prairie Grass in North Taranaki

By A. C. BURGESS, Instructor in Agriculture, Department of Agriculture, New Plymouth

PRAIRIE grass has long been recognised as an excellent winter producer on rich, warm, sandy soils. It grows in profusion around yards or under trees where ample stock droppings make the ground rich but where stock do not graze hard. The growing of it has been advocated by many farmers in Taranaki and other districts, but its use has been limited. The experience of two farmers, Messrs. W. Hunger, Brixton, and A. B. Gold, Tataraimaka, North Taranaki, has shown that with correct establishment and management this grass can have an important place on dairy farms in this district in providing better winter and early-spring feed.

THE value of prairie grass lies in its ability to produce feed in late autumn, winter, and early spring, when most other grasses are making little growth, and its high palatability. It is a short-lived perennial, but with incorrect management—insufficient fertiliser and close, continuous grazing—it will disappear from a pasture very quickly, if it becomes established at all. It should be sown as the dominant species in the sward and so managed that it is not eaten down close for long at any time of the year; it should also be allowed to reseed occasionally.

Both farmers have given their paddocks the more lenient management required for the successful maintenance of a prairie grass pasture.

Mr. Hunger milks for town supply, and he sowed prairie grass to supply some of the requirements of his winter milkers. The mixture used in one paddock was 60lb. of prairie grass and about 40lb. per acre of a normal grass seed mixture. The paddock is now about 15 years old and is still producing very well. In winter and early spring it is dominantly prairie grass. This paddock has been regularly topdressed with superphosphate and potash and occasionally given a dressing of blood and bone and shed manure and lime. The average rate of topdressing has been between 4 and 4½cwt. of phosphate, ½ to ¾cwt. of potash, and 5cwt. of lime per acre each year.

Successful Management

The management of Mr. Hunger has been an important factor in his success with prairie grass. Each year he has closed the paddock up in early April and has allowed it to grow up to 12 to 15in. before grazing it with milking cows. Before the winter of 1947 cows were grazed on this paddock of 5 acres for an hour or two each day until the paddock was grazed right down. It was then grazed through until the following April, when it was closed up again. Mr. Hunger considers that provided grazing is not too severe and that plenty of spell is given between grazing, it is not necessary to close the paddock in late spring or summer each year for hay.

In 1949 and 1950 the paddock was closed up in April, and in July fed off in breaks by using an electric fence. Each break was grazed at the rate of about 100 cows per acre. Unless the weather was wet and there was danger of poaching, hay and silage were fed out on breaks which had been grazed previously. By this method there was much better utilisation of the feed, the paddock was grazed more evenly, and it recovered more quickly. The cows milked exceptionally well when grazed on the prairie grass.

Mr. Gold first sowed 5 acres in autumn of 1948 with a mixture of 40lb. of prairie grass, 10lb. of short-rotation ryegrass, 2lb. of Montgomery red clover, and 2lb. of white clover per acre.

After careful preparation and ample topdressing with serpentine superphosphate and potash the establishment of all species in the paddock was excellent. In the early stages short-rotation ryegrass was dominant, but during the second winter and spring prairie grass produced prolifically and recovered rapidly after grazing. The clovers established well in the paddock and have maintained a dense cover. The paddock has been heavily topdressed twice each year with 3 to 4cwt. of serpentine superphosphate and ½ to 1cwt. of potash.

Prairie grass being fed off in breaks by cattle at a concentration of about 100 per acre.

In March, 1949, Mr. Gold sowed another paddock in pairie grass, but this time he reduced the quantity of short-rotation ryegrass to 5lb. per acre and increased the perennial ryegrass to 20lb. In this paddock, also, the prairie grass has established well, though it was dominated by short-rotation ryegrass in the first winter and spring.

His management of these paddocks is similar to Mr. Hunger's. Paddocks are shut up in April and grazed in July. Mr. Gold strongly advocates the use of an electric fence to feed off prairie grass in small breaks, and he has proved conclusively the value of quick grazing and spelling.

Both farmers have established prairie grass by broadcasting the seed when the seed-bed was prepared, discing it in, rolling, harrowing, sowing clovers and ryegrass, and rolling again. The prairie grass seed is then sown more deeply than the smaller seeds. In a recent sowing, however, Mr. Hunger sowed all the seed together, with quite satisfactory results.

Comparison with Short-rotation Ryegrass

In view of the well-known value of short-rotation ryegrass for winter and early-spring feed, it may be asked whether prairie grass has any advantages over this grass. Both require high fertility and lenient grazing. However, though Mr. Hunger and Mr. Gold recognise the value of short-rotation ryegrass and have sown it in pasture mixtures, they both maintain that prairie grass is also useful in similar conditions. Its erect habit of growth and quick recovery after grazing are two attributes which make it so valuable for early-spring feed. Ryegrass, especially short-rotation, is inclined to go down and become musty in the bottom, particularly after a mild winter. This type of feed will upset a herd of cows quickly in the early part of the season.

A trial designed to compare the production of prairie grass and short-rotation ryegrass is being carried out on a coastal farm near New Plymouth. A small paddock was sown in two mixtures. Half received 45lb. of prairie grass, 15lb. of perennial ryegrass, 3lb. of red clover, and 2lb. of white clover per acre, and the other half received 25lb. of short-rotation ryegrass, 15lb. of perennial ryegrass, 3lb. of red clover, and 2lb. of white clover.

Though short-rotation ryegrass established better than prairie grass, both parts of the paddock later produced very well and it was difficult to judge which was the better. Cows have been grazed on each side separately and up to the end of the second season there was an increase of 6 per cent. in the number of cow-hours from the short-rotation ryegrass part of the paddock compared with the prairie grass part. This increase in favour of short-rotation ryegrass is small and is offset by the more satisfactory type of feed given by the prairie grass.

In spring of 1950, that is, at the beginning of the third season of the pastures in this trial, prairie grass had increased considerably in quantity, but short-rotation ryegrass had almost disappeared from the sward. This is probably the result of spells between grazing being on the average only about 5 days, which appears to be too short a period for maintaining short-rotation ryegrass in the sward.

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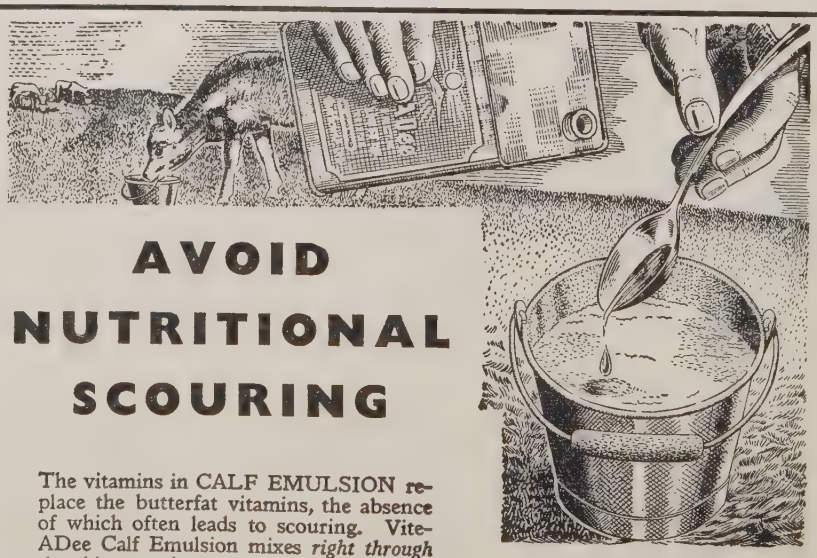

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Baling Ryegrass Straw after Heading

By R. INCH, Fields Instructor, Department of Agriculture, Ashburton

ONE of the problems of harvesting ryegrass with a header harvester is the disposal of the straw. If the crop is heavy, the straw must be shifted off the paddock as soon as possible, as a heavy covering of it tends to smother the pasture underneath. Even a light covering makes good protection for the porina (*Oxycanus*) caterpillar in its early stages, with consequent loss of pasture later.

SOME farmers sweep the material into a heap and burn it. Others bale it for feeding stock in winter, and it is then advisable to bale the straw as soon as possible after heading to gather it in as good condition as possible. All this takes time, and harvest is a busy season.

Mr. R. Good, of Ealing, Mid-Canterbury, this year made an attachment for drawing his baler behind the header. It was very simply done, and besides expediting the work did away with the need for an extra tractor and man to drive it, a considerable advantage where labour is scarce. Fig. 1 shows Mr. Good's device for drawing the baler.

A length of angle iron (A) was attached as a draw-bar to the chassis under the header and adjusted by a bolt through one of a series of holes in a wooden cross-bar B on the back of the machine. With this adjustment it was possible for all the work to be done with 4 men (the tractor driver, bag sewer, and 2 on the baler). There was an extra man to stack the bags on the sledge when he was available. Sledge loads were slipped off at corners, when the machine was turning, to keep the way clear for the following round.

The general idea of baling directly after the header as described is sound, but care must be taken that the hitching arrangements of the tandem rig are designed and proportioned to give ample strength while not imposing any adverse stresses on the machines employed.

Averting Damage to Header

The weight of the baler hitched directly to the back of the header may impose "jack-knifing" stresses on the header, which is not designed to have implements coupled to it. These stresses would in time tend to "break the back" of the header, throwing the riddles out of level, with resultant incomplete cleaning of the seed. This effect can be guarded against by correct arrangement of hitching equipment in relation to the design of the header, which may require strengthening against the stresses imposed.

Attachment for drawing baler behind header. Fig. 1—A length of angle iron (A) fixed to the framework under the header can be adjusted by a series of holes on the cross-bar (B) to keep the baler in the correct position. Fig. 2—The baler is attached directly behind the header. Fig. 3—The straw from the header is picked up immediately by the baler. Fig. 4—The bales of straw are placed on a sledge as they are ejected from the baler and slipped off at corners while the machine is turning.

Pruning to Control Growth Peculiarities of Some Apples

By E. B. MAY, Horticultural Instructor, Department of Agriculture, Auckland

TO overcome inherent peculiarities of growth of some apple varieties special pruning techniques must be used. Following are brief descriptions of two pruning treatments practised overseas and in some parts of New Zealand and which have been tried in Auckland recently.

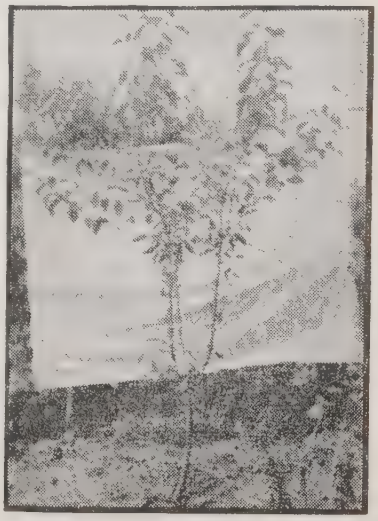
THE treatments are notching of dormant buds to induce shoot growth and bud nicking as an aid to tree formation.

Notching of Dormant Buds

Some apple varieties, such as Granny Smith and Rome Beauty, are characterised by the lower buds on the shoots failing to break, even after tipping, and remaining dormant. As a result there are long bare spaces where there should be branches or fruiting laterals.

A block of Granny Smith trees planted 3 years at Huapai (Waitemata County) was brought to notice in the winter of 1950 by the grower, who asked for advice on future pruning. Previous pruning had produced three to four leaders per tree, and the grower's experience suggested difficulty in encouraging formation of fruiting arms on the lower parts of these leaders. He was agreeable to some of the trees being used to test the value of bud notching. This treatment consists of notching about ¼in. above the bud, making the notch about 1/16in. wide through to the wood and extending to each side of the bud. A small piece of bark is thus removed and the wound heals over after a few weeks' growth.

In July, 1950, buds in an outside position and 6 to 9in. apart were selected and treated on a number of the trees, necessitating 20 to 25 notches to each tree. Some trees were left untreated for comparison, although on all



trees leading shoots were tipped to remove about a quarter of their length.

Photographed in February, 1951, the untreated tree illustrated above shows the characteristic unfurnished lower portions of leaders, there being little or no strong lateral growth below about 4ft. 6in.

The illustration below shows a typical treated tree furnished with strong,

wide-angled laterals down to within 2ft. 6in. of the ground.

This notching treatment appears therefore to initiate shoot growth from otherwise dormant buds, and the practice might be extended to other types and varieties of fruit having similar growth characteristics.

Bud Nicking

Pruning of 1-year rods by the removal of the top down to the height at which branching is desired often results in an unbalanced framework, the top shoot growing vertically and more strongly than those below. The photograph at left shows a typical result of such pruning.

An evenly spaced and balanced framework will result from the following treatment.

At the time of normal winter pruning and when the tree has been cut back to the required height the knife edge is pressed into the bark through to the wood about ¼in. below the top bud. This treatment results in a weaker growth from the top bud and a more even balance with the others.

The effect of this treatment is shown in the photograph at right.

METEOROLOGICAL RECORDS FOR MAY

Station	Height of station above M.S.L. (ft.)	Air temperatures in degrees (Fahrenheit)				Rainfall in Inches					Bright sunshine hours
		Approx. mean	Difference from normal	Absolute maximum and minimum		Total fall	No. of days of rain	Difference from normal	Maximum fall		
				Maximum	Minimum				Amount	Date	
Kerikeri	201	54.6	— 0.4	68.0	32.5	4.83	24		0.94	12	163.9
Auckland	160	55.8	— 0.8	69.8	40.4	3.72	19	— 1.26	0.54	15	170.0
Tauranga	10	52.6	— 0.7	66.5	31.5	5.39	12	+ 0.55	1.50	13	190.8
Ruakura	131	49.6	— 1.8	67.1	24.8	3.56	17	— 1.02	1.40	15	174.7
Rotorua	969	49.2	— 0.5	64.2	28.5	3.28	11	— 2.18	1.12	15	153.7
Gisborne	12	52.4	— 0.4	65.1	34.4	5.38	21	+ 0.89	1.77	3	100.1
New Plymouth ..	160	52.6	— 0.8	65.0	35.8	4.20	13	— 1.69	0.82	28	179.9
Napier	5	52.3	— 0.1	67.2	31.7	3.81	16	+ 0.60	1.53	2	107.4
Kariol	2125	45.4	+ 1.3	66.0	27.0	5.16	13	+ 1.22	1.10	15	
Wanganui	72	51.2	— 0.7	66.2	33.8	4.08	19	+ 0.85	1.06	30	156.4
Palmerston North .	110	49.8	— 0.7	63.0	31.0	2.23	14	— 1.17	0.54	15	126.5
Waingawa	350	48.5	— 0.5	65.0	29.3	2.58	17	— 1.42	0.93	21	113.6
Wellington	415	49.9	— 1.3	62.9	35.5	4.70	16	+ 0.36	0.76	2	117.4
Nelson	24	49.6	— 0.9	62.4	30.8	4.63	7	+ 1.48	1.50	15	183.9
Blenheim	12	47.5	— 2.5	64.3	28.3	1.59	7	— 0.71	0.54	15	173.5
Hokitika	12	47.0	— 1.2	65.0	28.3	6.86	12	— 2.59	1.83	28	164.8
Hanmer Springs ..	1225	41.0	— 3.5	64.2	19.0	1.87	10	— 2.73	0.37	21	121.0
Christchurch ..	22	46.6	— 0.9	64.7	31.1	3.25	11	+ 0.37	1.02	21	123.7
Ashburton	323	44.0	— 1.9	67.2	26.6	0.88	5	— 1.61	0.40	20	148.7
Timaru	56	44.9	— 1.8	62.6	28.0	0.26	5	— 1.25	0.10	21	162.6
Alexandra	520	40.4	— 2.5	64.4	20.8	1.89	10	+ 0.96	1.04	28	161.6
Taieri	80	43.8	— 2.1	68.1	24.6	2.22	12	— 0.08	0.55	20	136.2
Invercargill ..	32	44.5	— 1.2	65.0	23.0	3.85	18	— 0.35	1.32	16	128.0

USES OF CYPRESS TREES ON THE FARM

DESCRIPTION of the evergreen trees commonly grown on farms for shelter or timber is continued in this article by H. M. Steven, formerly Assistant Farm Forestry Officer, Department of Agriculture, Wellington. A previous article appeared in the December, 1950, "Journal". To many farmers all cypresses are macrocarpa. Means of distinguishing the different species are described and their value as farm trees discussed.

MEMBERS of the cyprus family (*Cupressaceae*) have been planted nearly as widely in New Zealand for shelter as have the pines, though there are many fewer species than in the pine family. Cypresses bear a woody cone and so are grouped with the pines as conifers, but members of this group differ from each other more widely in general appearance, use, and quality of timber than do the pines.

The six trees considered in this article are: Lawson's cypress (*Chamaecyparis lawsoniana* A. Murray), Port Orford cedar, or "lawsoniana"; Monterey cypress (*Cupressus macrocarpa* Hartweg) or "macrocarpa"; Bentham's cypress (*Cupressus lusitanica*, var. *benthami*, Carriere); Arizona cypress (*Cupressus arizonica* Greene); Mexican cypress (*Cupressus lusitanica* Miller); and Mediterranean cypress (*Cupressus sempervirens* Linn). The last three have been planted in New Zealand to only a limited extent, and of them the Arizona cypress promises to be most valuable for shelter.

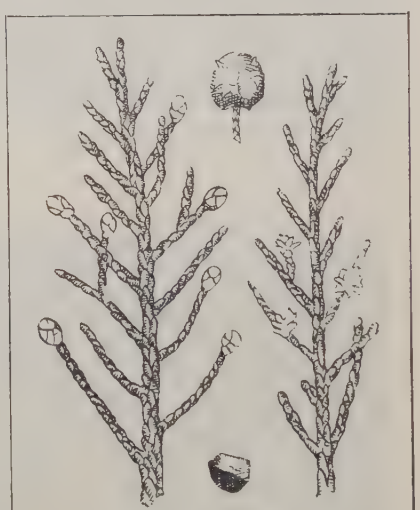
All are evergreen trees used in many parts of the world as ornamentals, especially when they are young, and they do not rank among the world's big trees, few of them exceeding 100ft. in height. The form of most is pyramidal, a feature most obvious in Lawson's cypress. Individual trees with ample space retain their lower branches to the ground for a long time, but, if the trees are crowded, lack of light will cause low branches to be suppressed. The branches may be erect and spreading, as in macrocarpa, or pendulous, as in Lawson's cypress.

Cypresses are divided botanically into two groups, the "true" cypresses (genus *Cupressus)* and the "false" cypresses (genus *Chamaecyparis)*. In the first the branches are ascending or spreading, with branchlets pinnately divided in several planes and usually big cones which take 2 years to mature and have many seeds on each scale. The false cypresses have flattened branchlets, small cones maturing in the first year, and not more than 6 seeds on each scale.

There are several kinds of leaves among the cypresses. Mature leaves are in opposite pairs, triangular, scale-like, and very small—in many species less than ¼in. long. The leaves are not shed singly, but after 2 or 3 years' growth entire branchlets drop off. On the back of a leaf is often a groove or pit bearing in some species a gland which exudes a clear resin, white and very sticky when it dries. The foliage is green (bright or dull) with a powdery bloom, grey-green or bluish green. Leaves of seedlings are quite different from those of an adult tree, being linear, almost needle-like, and without resin glands.

The male cones are produced abundantly and usually are first visible during late summer. When they mature in spring they give the trees a distinctive colour. Each cone is four sided and tapering, about 1/10in. long, and made up of a number of scales.

The female cones at first appear as enlarged tips of short branchlets, but as they develop the 6, 10, or 12 scales swell and spread apart. During the first season these scales develop into a round cone and on each scale the projection or horn becomes very prominent. While young a cone is often glaucous (white and powdery), but as it ripens the surface becomes darker. When there are resin pockets underneath the surface the cone has a warty appearance. The seeds in a cone vary in number from 60 to 150; they are often flattened and have a narrow wing attached.



Typical growths of cypresses. Left—Branchlet with male flowers. Right—Branchlet with female flowers. Upper middle—Female cone. Lower middle—Seed (twice comparative size).

HEADING PHOTOGRAPH: A single row of Lawson's cypress interplanted with eucalyptus species.

GENERAL APPEARANCE: Broadly pyramidal, with heavy drooping branches to ground level. HEIGHT: 175ft. in Oregon. BARK: Smooth when young, becoming reddish brown, thick, and scaly. FOLIAGE: Branchlets fine and flattened. Leaves 1/16in. long, scale-like, with vague white markings on the backs; borne in unequal pairs with spreading tips; dark green; characteristic aromatic odour. FEMALE CONES: Borne in clusters of a few. Roughly spherical, $\frac{1}{4}$ to $\frac{1}{3}$in. in diameter, greenish grey to red-brown; 8 scales. SEEDS: Long, rich brown, and rough because of the presence of resin tubercles; 2 to 5 per scale.

In the true cypresses (macrocarpa, for example) the female cones ripen in their second year, but in Lawson's cypress they ripen in the first autumn.

Lawson's Cypress

A native of America, Lawson's cypress grows wild in forests of south-west Oregon and north-west California, where the climate is very moist. This species is most abundant there at altitudes below 3000ft., where it comes under the influence of ocean winds, but in New Zealand sea winds seem to have a burning effect on the foliage and it is not recommended for coastal planting. It will grow on almost any good farm soil which is neither too dry nor too wet. Where the rainfall is low, growth is very slow; if the drainage is poor and the subsoil so wet that roots are not aerated sufficiently, Lawson's cypress may die off from "wet feet".

The bark is very thick, almost spongy, reddish brown and scaly on old trees but smooth and thin on trees up to 30 years old. Unlike those of the true cypresses, the branchlets in Lawson's cypress are flattened and there are ill-defined white streaks on the under surfaces of the leaves. The leaves are scale-like, 1/16in. long, and closely pressed to the stem in opposite pairs.

The male cones are pinkish, appearing in masses on the small branchlets in early spring.

Female cones are borne a few together near the tips of the branches. They are a dullish green-grey until they mature, when they become reddish brown. There are 8 scales in the cone, each scale bearing 2 to 5 seeds about $\frac{1}{8}$in. long with two broad lateral wings. The cones and the seeds are both slightly rough and warty because of the resin tubercles carried on their surfaces.

For shelter there is no better tree than Lawson's cypress, or "lawsoniana" as it is commonly called, but because of soil and climate conditions it is not suitable for all districts. Differences between the rate growths in various parts of the country are marked. Around Taumarunui in the King Country trees will grow up to 2ft. a year, but in Otago and Canterbury a tree 20 years old may be only 15 or 20ft. high.

High Shelter Belts

Most often Lawson's cypress is used as a single-row belt because it retains its branches low down, providing dense shelter to ground level if it is well fenced off from stock. This species can probably be ruined more quickly by stock than any other type of belt; cattle will chew it and also damage it by rubbing against it.

The trees spread their branches widely and should be planted 15ft. apart and 15ft. from the fence. Some farmers make temporary use of the strip of ground between trees and fence for the first year or two by planting a crop such as potatoes, and this has the advantage of keeping down weeds.

Trimmed Hedges

Well-trimmed, thriving hedges of Lawson's cypress are frequently used for shelter, but much trimming is needed to keep such a hedge narrow and as the roots absorb nutriment from a large area, it is not very suitable for a small section. Moreover, the nursery from which the plants are obtained may contain several types of this cypress, some of which grow more vigorously than others, and keeping these cut back hard is likely to cause some trees to die off, leaving an unsightly gap in the hedge. Like all other conifers, Lawson's cypress cannot stand being cut hard, as it can send out new growth only from green wood and not from the old bare wood further back.

However, Lawson's cypress is useful for orchard shelter and is used for this purpose both trimmed and untrimmed, particularly in Hawkes Bay.

Mixed Belts

Lawson's cypress may be planted in a mixed belt with the quicker-growing pines, eucalypts, or Lombardy poplar, which give high shelter for the paddock more quickly and protect the slower-growing tree. Species are better planted in two or three separate, alternately spaced rows. Such a multiple belt will make better shelter than a single row, though more trees are required and greater area of ground is used.

Combining pines with Lawson's cypress is satisfactory only if the pines are kept at least 15ft. away so that the cypresses are not suppressed by being overtopped. This combination is of value in coastal areas where Lawson's cypress cannot stand the full exposure to salt-laden wind, and pines can be planted on the exposed side.

Clumps and Plantations

Lawson's cypress may be grown in a clump to provide shade and shelter, and for such a purpose the trees may be planted in a corner between several paddocks where they can benefit all of them.

At present there is no demand in New Zealand for the timber of Lawson's cypress, so few of the trees have been planted in pure plantation blocks. In North America it is considered a valuable tree, the timber of which is strong and durable but light, and it is used in the building of houses, for furniture making, for railway sleepers, and other purposes.

Renovation of Open Belts

As Lawson's cypress does not naturally open up below, renovation of a belt is necessary only when the trees have been damaged by stock and so become open. A hedge species such as karo, barberry, or eleagnus may be planted on the sunny side of the damaged belt 6ft. from the bare stems, or a new line of Lawson's cypress may be planted and the fence moved out.

Under favourable growth conditions Lawson's cypress may recover after being topped, provided some green foliage has escaped the attentions of the stock.

Homestead Shelter

For planting round the home a more useful tree than Lawson's cypress would be hard to find, as not only does it give very efficient shelter, but it is a tidy and attractive tree and some of the coloured and weeping varieties make excellent specimen trees when grown singly in a garden.

It is also useful in a shelter-belt driveway, though for the homestead approach a mixed planting of Lawson's cypress with, say, wide-spaced Oregon pine or colourful broadleaf trees such as oaks or poplars is more attractive.

The slow rate of growth of a Lawson's cypress is probably responsible for its not being more widely planted. If space permits, a combination of a temporary row of pines, which afford shelter quickly, with a row of Lawson's cypress to leeward is most satisfactory. The pines should be removed when the Lawson's cypress have become well established.

Propagation of Lawson's Cypress

Lawson's cypress is not difficult to grow. Tree stocks may be grown from seed in the home garden, but because of the time needed to produce stock suitable for planting many farmers prefer to buy 2-year-old seedlings or transplants from nurserymen.

Nursery stock when grown from seed shows many variations in form; some trees droop much more than others, some grow tall with light, open branching, and others are heavily branched bushy trees. That is not so when heeled cuttings are used; these

grow into trees true to the type of the parent without the variations which occur in stock grown from seeds.

Macrocarpa

Another tree important for shelter planting in New Zealand is *Cupressus macrocarpa*, the Monterey cypress, a species which has a very limited range in its native country, where it occurs only in parts of southern California. In Britain it has been planted in the warmer areas for decorative purposes and for shelter against sea winds. In South Africa, Australia, and New Zealand it is growing in plantations for timber or in blocks and belts for farm shade and shelter.

In its native home it never grows to a great height and is so unimportant that it is frequently overlooked as timber, but in New Zealand its hardiness to wind and frost and its rapid growth, added to the value of its timber, make it a valuable tree, sometimes referred to as "the farmer's tree". It will also stand considerable shade, so it can be planted with other species, such as pines or eucalypts, and still thrive unless overshaded by them.

It is very hardy under a wide range of climatic conditions throughout New Zealand, but it grows best on a good, deep, porous, well-drained soil where the rainfall is good, though it will grow in much less favourable situations where the soil is even clayey or sandy. It is least successful in very dry places such as parts of Canterbury or Otago and in wet areas such as parts of Northland and Westland. In damp places where the water-table is high, damage is likely to be caused by wind, foliage being burnt off and trees uprooted. Macrocarpa is sometimes hard to establish in dry areas, but once it has a firm hold it will survive adverse conditions well.

The many forms of macrocarpa fall into two main types. The tall, straight, single-stemmed type usually grows in sheltered areas under plantation conditions; trees of this group may grow up to 100ft. high, though these are exceptional. The more common type in New Zealand is a much-branched tree with no main leader and an irregular trunk, the sideways spread nearly equalling the height of the tree (40 to 60ft.); macrocarpa of this form grows on exposed headlands, at high altitudes, in coastal areas exposed to salt spray, and in the open where it has plenty of room to spread its branches.

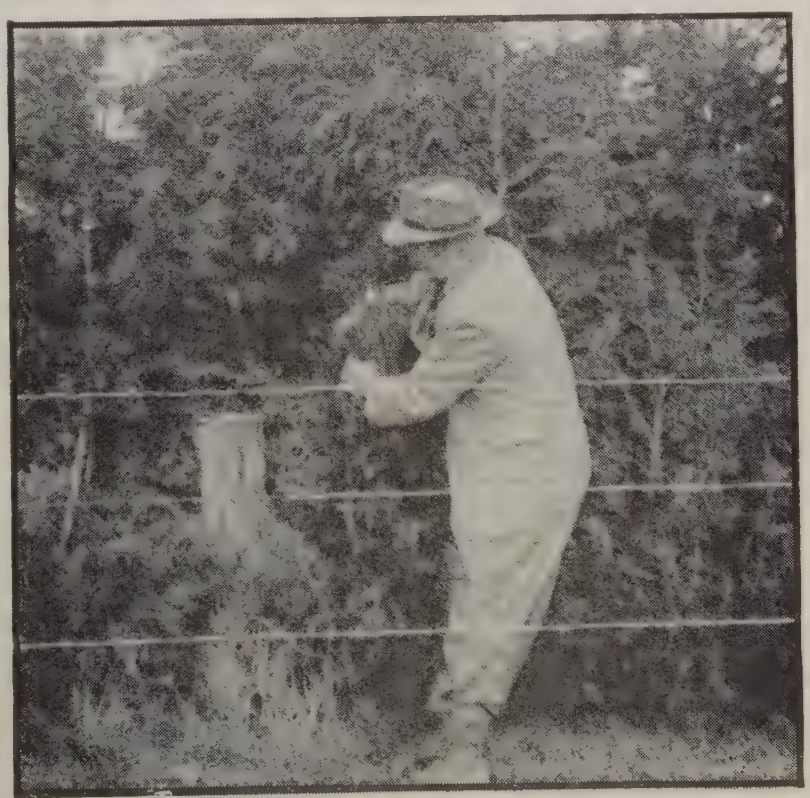
The bark on a young tree is reddish brown, but as the tree approaches maturity the trunk becomes grey-brown with flat, scaly ridges. The branchlets are four sided with green leaves (never a bluish green) in alternating pairs. The leaf is small and scale-like with a furrow down the back; the apex is usually blunt.

The male cones are about $\frac{1}{8}$in. long, green at first and ripening to yellow, and are produced in such abundance at the tips of the short branchlets that they give the tree a golden tinge in early summer.

The female cones are borne singly, but they appear later to be in clusters of up to 12 cones, as the branchlets on which they are borne are very short and close together. At first, about June or July, these cones are like thickened tips, but soon the 8 to 12 scales of the cone swell and then spread out. Pollination is effected by wind-borne pollen from male cones on the same or neighbouring trees, the

Sparrow Industrial Pictures Ltd. photo.

Above—This hedge of Lawson's cypress was topped after being damaged by stock. Below—The regrowth made 3 years after the hedge had been topped.



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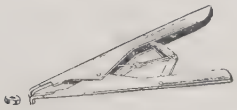

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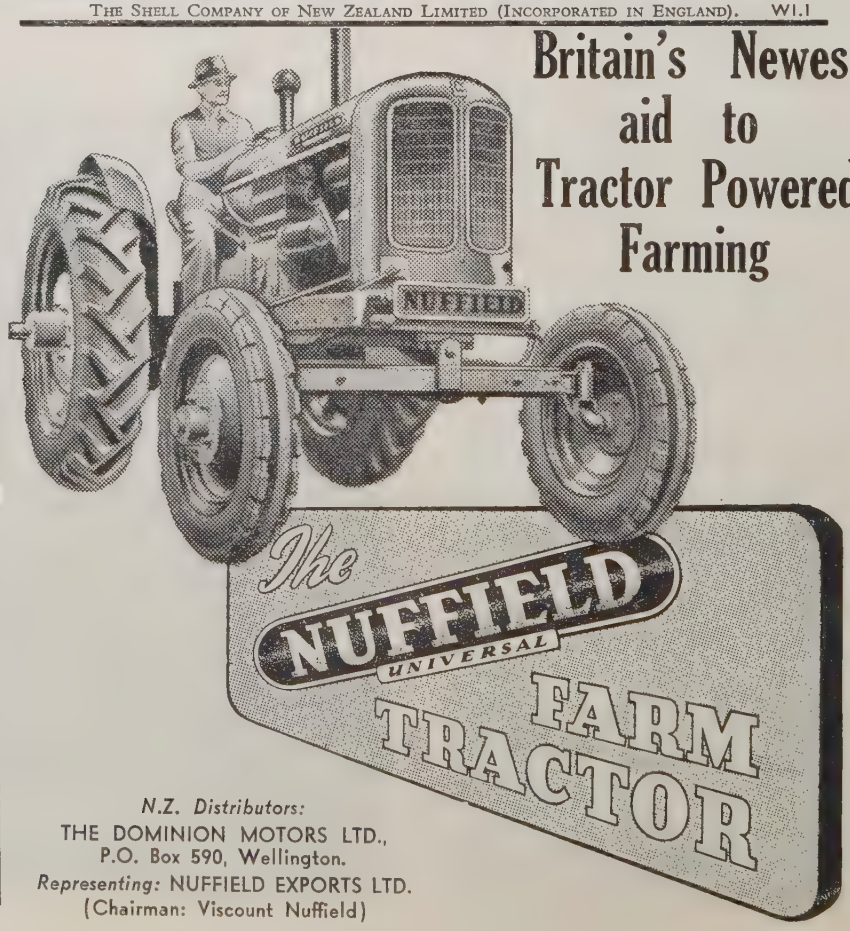

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scales close, and the cone then enlarges. At the end of the first season it is about ½in. across and the scales have conspicuous, curved projections (umbos). During the second season the surface of the cone turns brown and shiny and the projections become less conspicuous. A ripe cone is round or slightly oval, 1 to 1½in. long and ¾ to 1in. wide. Each cone bears 140 seeds, which are irregular in outline and about as long as broad, with minute resin tubercles on the surface. The narrow margin or wing attached to the seed is easily seen.

GENERAL APPEARANCE: Dense, roughly pyramidal at first but irregular later; green or yellowish green. HEIGHT: 70ft. in California. BARK: Reddish brown, becoming lighter brown, with flat, scaly ridges. FOLIAGE: Bushy and compact. Branchlets in all planes, 4-sided at the extremities. Leaves triangular, 1/24 to 1/9in. long; borne in equal pairs with blunt, swollen tips; dull or yellowish green. FEMALE CONES: Borne in clusters of up to 12. Globose or longer than wide, 1 to 1½in. long, green, shiny brown, or dull grey; 8 to 12 scales. SEEDS: Dark brown, irregular in shape, with tubercles on both surfaces; 12 to 18 per scale.

Macrocarpa as Shelter

Farmers have recognised in macrocarpa a very useful tree for shelter and for timber, especially for fencing posts, but much timber, labour, and effort have been wasted in growing poor-type trees in scattered and open formation. Single rows of *Cupressus macrocarpa* have been planted, but these tend eventually to open at the bottom, a tendency which is hastened if stock have access to the belt. In such single-row belts the trees are rarely well shaped, but are heavily branched and irregular, with timber full of knots and difficult to handle.

It is a good tree for coastal areas, though strong westerly or southerly winds carrying salt spray often cause the tips of the branches to be burnt and turn brown. Multiple belts are most satisfactory against sea winds.

Mixed and Multiple Belts

Macrocarpa is used in many combinations with eucalypts, pines, Lawson's cypress, or Lombardy poplar, either in mixed rows or in multiple belts. In some belts the overhang of its own branches forms a screen which helps to stop ground draught, but that is not always so, and to counteract the effect of its opening up below macrocarpa should be green-trimmed for about 10ft. up to maintain a solid screen or be used with a tree of low-branching habit or a hedge.

For variety pines are used with *C. macrocarpa*, and in some districts, depending on locality and soil type, the macrocarpa will gain height as quickly as the pines, at least for some years. This is not a good mixture, because both species are likely to be opened up by the loss of bottom branches.

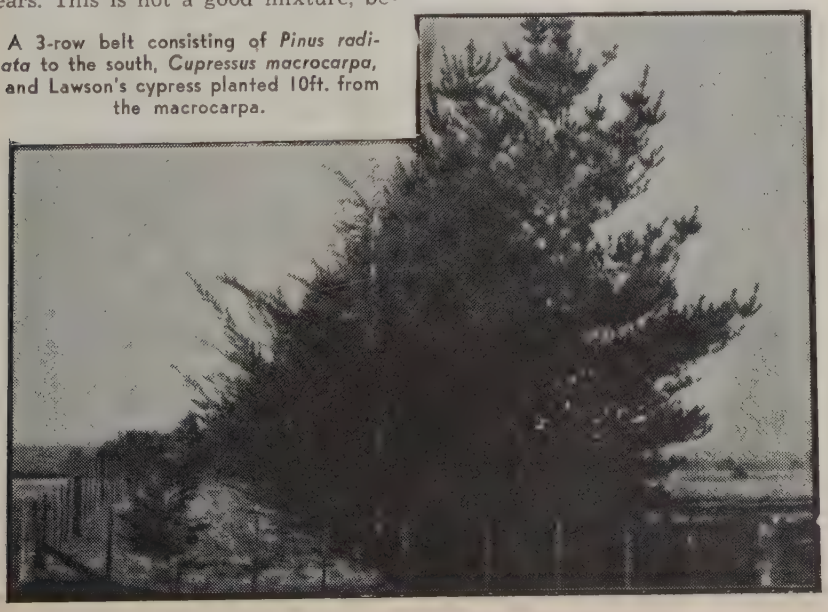
A 3-row belt using Lawson's cypress to the north, macrocarpa in the centre, and pines to the south is often grown. As it is much slower growing, the Lawson's cypress should be planted at least 15ft. from the next row, or the farmer may find he has to cut back the macrocarpa to prevent it smothering the Lawson's cypress. This combination, if well spaced, makes very efficient shelter.

Trimmed Hedges

High shelter hedges of *C. macrocarpa* are grown throughout New Zealand. Both top and sides may be cut or only the side branches kept trimmed, leaving the tops to grow on. In either case dense shelter to the ground can be maintained. Particularly in parts of Southland, side trimming of green branches is started early (in the first 6 to 10 years) and repeated often, resulting in a narrow, high hedge kept to a width of 18 to 24in. Cutting back into bare, woody branches of greater diameter than 2in. almost always results in the killing of that side of a macrocarpa, producing a dead patch such as is often seen in older hedges.

When the height is reduced by topping there is less shading in winter and grass grows closer to the fence than if there is a wide overhang of branches from tall trees.

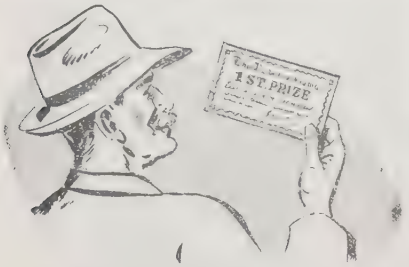
A 3-row belt consisting of *Pinus radiata* to the south, *Cupressus macrocarpa*, and Lawson's cypress planted 10ft. from the macrocarpa.



Occasionally a farmer is convinced that stock losses in young calves and abortion in dairy cows are caused by their eating material from macrocarpa either directly from the tree or by picking up hedge trimmings. Scientific tests which are still in progress indicate that many so-called cases of macrocarpa poisoning are attributable to other causes. Feeding tests have given little conclusive evidence against macrocarpa. However, farmers would be well advised not to allow stock access to hedge cuttings.

Plantations and Gorse Control

Cupressus macrocarpa is useful in blocks in paddock corners and on less valuable land, providing useful farm timber and fencing posts. Trees should be planted with 8 or 9ft. between them provided the soil is good and not too dry; they will then tend to develop straight trunks with lighter side branching than the heavily branched variety which often develops a forked, uneven trunk.



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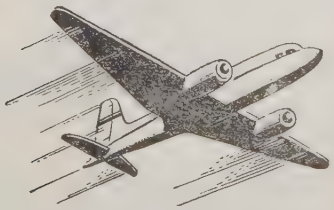

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Macrocarpa is not as satisfactory as pines for suppressing gorse and other weeds, as usually it grows less vigorously at the start and therefore takes longer to bring the gorse under control by overshading it; its establishment is also less reliable in the dry soil associated with gorse. Trees planted for gorse control should be spaced 7ft. apart each way.

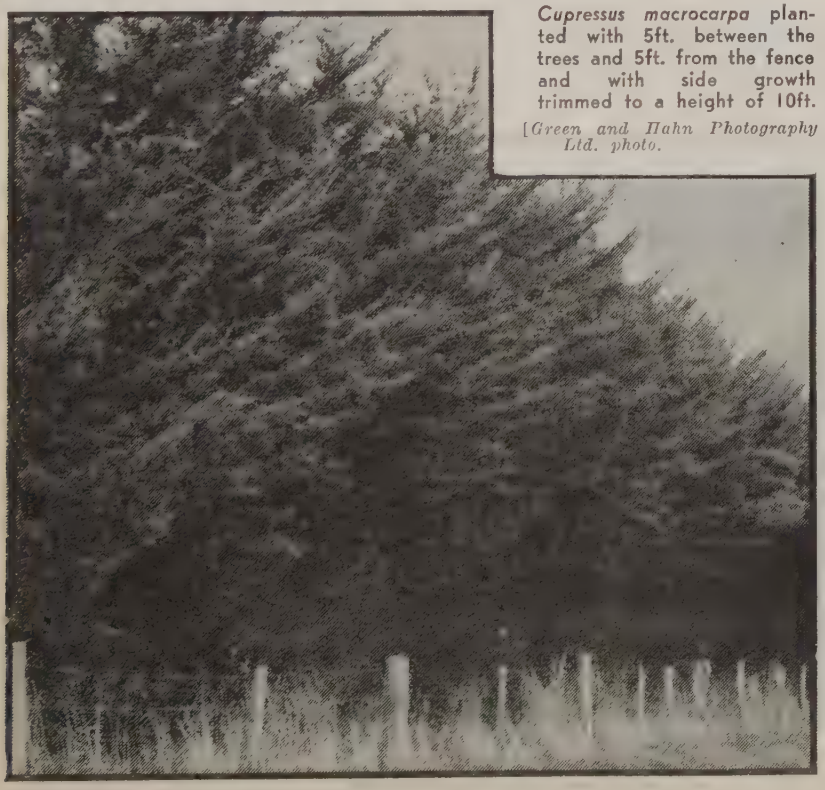
Homestead Shelter

As either an untrimmed belt or a hedge *Cupressus macrocarpa* is grown round at least four out of five New Zealand country homesteads and usually the trees are too close to the buildings. In New Zealand the macrocarpa has little ornamental value and where single trees have been planted they are being cut out because of their size and dense shade. Young macrocarpa trees should not be planted closer than 3 or 4 chains from the house. They may be planted along a driveway as back shelter for less hardy trees and ornamental shrubs, or a multiple belt of macrocarpa may be grown with the drive winding between the rows. Such a driveway belt is also a very effective windbreak, but it tends to result in a dark roadway with a damp surface.

Propagation of Macrocarpa

Difficulty is sometimes experienced in raising *C. macrocarpa* from seed, as germination percentage is naturally low, but seedlings may be obtained more easily by "pre-germinating" the seed. An ounce or two of seed may be kept in a damp mass in a shallow, open container and left in a warm place until the seed swells and cracks its outer covering and the root tip becomes visible. Then the seed should be sown in shallow drills in fine, damp soil.

GENERAL APPEARANCE: Wide spreading and pyramidal, with drooping leaders and side branches; blue-green. HEIGHT: 100ft. in Mexico. FOLIAGE: Open. Branchlets 4-sided but coming off the stem in 2 planes. Leaves $\frac{1}{8}$in. long and scale-like, with tips pressed closely into the stems; sweet odour. FEMALE CONES: Borne in groups of 3 or 4. Almost spherical, $\frac{1}{2}$ to $\frac{3}{4}$in. in diameter, green-purple or glaucous brown; 8 to 10 scales. SEEDS: Light brown, with wings; rough surfaces caused by the presence of many resin tubercles; 8 to 10 per scale.



Cupressus macrocarpa planted with 5ft. between the trees and 5ft. from the fence and with side growth trimmed to a height of 10ft.

[*Green and Hahn Photography Ltd. photo.*

Two-year wrenched seedlings or 2-year transplants are best for planting out, and these require to be handled carefully to keep the roots from drying out or losses may occur during establishment. If possible, damp, dull weather should be chosen for planting. Results are best from trees about 12in. high, well wrenched, and planted in ground which has been well cultivated.

Bentham's Cypress

There has been much discussion about Bentham's cypress, its origin and relationships, but it is generally agreed that the tree known in New Zealand as *Cupressus lusitanica* var. *benthami* is one of a group of cypresses native to Mexico. The suggestion is frequently voiced that it is a form of macrocarpa. Other people wrongly consider it a hybrid resulting from a cross of Lawson's cypress with macrocarpa, but that is not so, though Bentham's cypress in some characteristics appears to be intermediate between the two.

Where Lawson's cypress will not thrive Bentham's cypress is a good substitute. The tree grows with a wide pyramidal form, usually not as tall as *C. macrocarpa*, from which it is distinguished by the more drooping leader and side branches and by the blue-grey leaves, which contrast with the definitely green, often yellow-green, foliage of macrocarpa. Branching is more open than in Lawson's cypress or macrocarpa, but the tree keeps its branches to the ground until it is quite old. The branchlets, borne on alternating sides of the stem, are bushy and

[*Photo News Ltd. photo.*

GENERAL APPEARANCE: Dense crown; bole becoming bare with age. HEIGHT: 70ft. in Arizona. BARK: Reddish brown, scaly, fibrous, and furrowed. FOLIAGE: Branchlets 4-sided, smooth, stout, and short. Leaves 1/20 to 1/12in. long, pressed closely to the stem, light green or grey-green; strongly glandular with polecat odour. FEMALE CONES: Borne singly or in clusters of 3 to 5. Slightly longer than wide, ½ to 1in. long, reddish brown; 6 to 8 scales. SEEDS: Medium brown, broad with few resin tubercles; 8 to 10 per scale.

not flat as are those of Lawson's cypress. The leaf is scale-like and ⅛in. long, with the tip pressed closely to the stem, and sometimes has a pit on the back which is the resin gland.

The cones, borne in groups of 3 or 4, are spherical and typically much smaller than in macrocarpa, being not more than ½in. across when mature. There are 8 to 10 scales, each with a sharp boss. During the first year the cones are greenish purple and covered with a white bloom, but most of them turn brown as they ripen at the end of the second year. On each cone scale are 8 to 10 seeds 1/16in. long and somewhat irregular in shape, each with fairly narrow, light-coloured wings. The resin tubercles below the surface make the seeds rough to touch.

Bentham's Cypress as Shelter

As Bentham's cypress will grow where neither macrocarpa nor Lawson's cypress flourishes because of wet soil, it is particularly valuable in some areas. It grows more successfully inland than if exposed to salt winds, which are likely to burn off the tips and make the trees straggly and windswept. Bentham's cypress may be planted in coastal areas, but with the line of the wind rather than at right angles to it; the end trees then provide some protection to the rest of the belt.

Bentham's cypress grows better than most coniferous species on the Northland gumlands, but it thrives best on the more fertile soils of that region. However, because of its more open form it does not provide such dense shelter untrimmed as Lawson's cypress. It is grown as single belts and its growth usually is slightly quicker than that of *Cupressus macrocarpa;* whether it will sustain efficient growth as high shelter is not yet proved. The chief disadvantage of this species is the extreme variation within a belt from trees with bushy, wide crowns to trees with open, light branches or brush-like, narrow forms.

[*Canterbury Agricultural College photo.*

Cupressus arizonica, 8 years old, growing on dry shingle land.

Trimmed Hedges of Bentham's Cypress

A single row of Bentham's cypress makes an efficient hedge if the trees are tipped back early and often to keep the hedge green and thick. Light trimmings can be started when the tree is 3 or 4ft. high. This is worth doing, but the main disadvantage is the labour of keeping more than a limited length under control.

Mixed Plantings

Bentham's cypress probably grows best pure and not in a mixture, though it can be combined with Lombardy poplar or eucalypts which give height to the shelter or with prickly-cone pine *(Pinus muricata)*. The combination with *P. muricata* is used in coastal localities with the pines on the outside giving shelter to the less hardy cypresses. Poplars or Bentham's cypress either alternating in a single row or, better still, in 2 or 3 rows, are very suitable for the wetter parts of the country on low-lying land.

Wide Spacing Necessary

Wide spacing is necessary with Bentham's cypress because of the strong sideways growth of the branches, but if started early enough, green trimming of the lower part will counteract this tendency and preserve a green screen. At least 10ft. should be left between the trees and the fence and 9 to 10ft. between trees in the line.

Block Planting

The value of the timber of Bentham's cypress has not been proved and pure plantation blocks have not yet been grown. The timber available from trees which have been sawn has not been in use long enough for any conclusions to be drawn, but it appears to have qualities similar to those of macrocarpa.

Homestead Planting

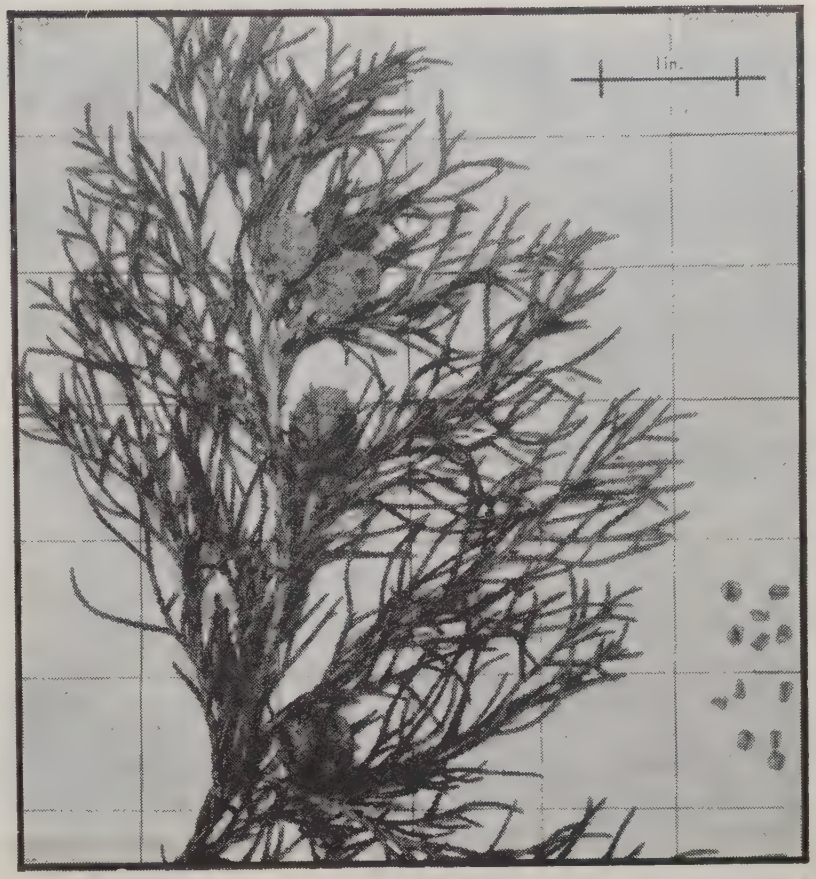
Bentham's cypresses are growing in New Zealand as elderly trees planted as specimens or in mixed belts around the older homes. Like other cypresses they should not be placed too near buildings, but there is probably a place for their use as distant shelter on areas too wet or too dry for Lawson's cypress.

Propagation of Bentham's Cypress

Seedlings of Bentham's cypress are very blue, glaucous, and rapid growing, but rather difficult to harden off, so 2- or 3-year transplanted stock from nurserymen should be used. Seed is likely to produce many varieties of seedlings, so trees of similar habit should be selected for planting stock, preferably those with a regular bushy shape and of comparable height.

Arizona Cypress

One of the high-country trees found in the mountains in parts of Arizona and Mexico at altitudes between 4500 and 8000ft., the Arizona cypress *(Cupressus arizonica)* grows best there on moist, gravelly slopes, but also grows on dry, rocky soils. It has not been planted widely in New Zealand, but young trees are thriving in low-rainfall areas at Canterbury Agricultural College and at Ashburton and Balclutha, and it may be suitable for the higher, dry parts of Canterbury and Otago.



[*Photo News Ltd. photo.*

GENERAL APPEARANCE: Fairly tall with pendulous branches; dark green or blue-green. HEIGHT: 100ft. in Mexico. BARK: Red-brown, splitting vertically into strips. FOLIAGE: Branchlets flexible and hanging. Soft whipcord leaves, clear green or blue-green, sharp pointed, 1/16in. long, borne in equal pairs; sometimes smelling of fish oil. FEMALE CONES: Borne in clusters of up to 6. Up to ¾in. long and almost as broad; glaucous brown; 6 to 10 scales, most commonly 8. SEEDS: Rich light tan, smooth with no resin tubercles; 8 to 12 per scale.

In Arizona this cypress grows to 60 and even 70ft. high, with a trunk which tapers considerably and a dense crown of branches. The branchlets are short and stout, smooth, and four sided, bearing light, compact foliage.

The grey-green leaves are scale-like, 1/20 to ⅛in. long, pressed closely to the stem and glandular. They have a very unpleasant cat-like odour when bruised. On young trees the bark is reddish brown and comes off in scales, but on older trees it becomes fibrous and furrowed.

Cones of the Arizona cypress, carried on short stalks, are large—½ to 1in. across and longer than broad. Each has 6 to 8 reddish-brown scales which have prominent bosses, and each bears 8 to 10 seeds which are golden brown, 1/6in. long, and winged.

In appearance *Cupressus arizonica* resembles both *C. macrocarpa* and *C. lusitanica* var. *benthami*, but its short, stout branchlets and the characteristic unpleasant smell of the foliage distinguish it from these species. Its cone is larger than that of Bentham's cypress.

Mexican Cypress

Specimens of Mexican cypress *(Cupressus lusitanica)* are growing fairly widely throughout New Zealand and probably were either planted as specimen trees under their own name or were erroneously included in bulk parcels of nursery stocks of cypress. Most of them were planted 30 to 40 years ago.

Many observant farmers know that among their old trees are some which do not look exactly like other known cypresses, and many of these intruders are probably *Cupressus lusitanica* or possibly hybrids of this and *C. macrocarpa*. The limits of this species are difficult to state, as it occurs with many variations and has been variously classified by differing authorities. It is a native of Mexico, though for a long time its origin was obscure, as it grows also in Portugal and was regarded as having originated there. The explanation generally accepted is that it was introduced to Portugal by friars from Mexico 300 years ago.

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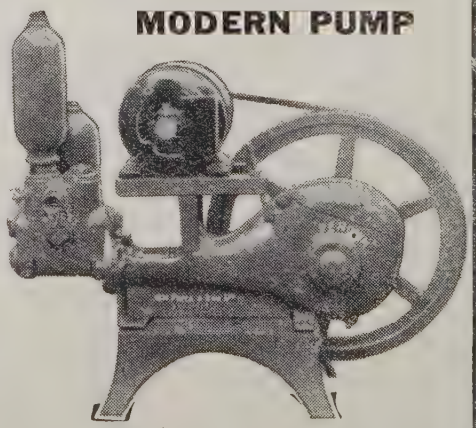

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This species is included within the scope of this article because plants of the lusitanica type are occasionally included with macrocarpa stock, from which they may be distinguished by their drooping branchlets with whipcord type of leaves which are soft, not harsh and upright as are those of macrocarpa; they are usually clear green and even when crushed the foliage has no strong odour.

The cones, both male and female, are produced in great numbers on the same tree. The female are glaucous white, roughly spherical, and ¼ to ½in. in diameter in the first year, becoming brown as they enlarge to about ¾in. In New Zealand trees 40 to 50 years old have grown to a good height and tend to have straight boles with pyramidal crowns and generally lighter, more drooping branching than typical *C. macrocarpa*, with useful timber.

Mediterranean Cypress

Though it is not common, another cypress grown in New Zealand is the Mediterranean cypress (*Cupressus sempervirens*). It can be identified readily by its very large cones, which are more than 1in. long. It is found naturally in Persia and in Syria, Crete, Greece, and other countries around the Mediterranean, where it grows up to 150ft. high. There are two types of this tree, one with the normal pyramidal crown and the other an upright variety with erect branches, and both grow in New Zealand. The second variety is known as *C. sempervirens* var. *stricta* and is often planted in streets as an avenue tree or as an ornamental garden tree. This species grows best in good, moist, loamy soil, but will grow on poorer, drier soils. It is slow growing and will not stand excessive cold, but will withstand coastal conditions in moderation.

The bark is thin, smooth, and greyish brown with vertical fissures. The branchlets alternate and spread irregularly, carrying the leaves in four equal ranks. They are blunt and marked with furrows down the backs, but without swollen tips. The cones borne on short curved stalks are spherical or ovoid, 1 to 1¼in. long, shining brown or greyish, and composed of 8 to 14 scales which have ridge-like processes and bear 8 to 20 seeds each. These are long and rectangular with wings, but have no resin tubercles.

Little Used as Shelter

This species has been planted little for shelter in New Zealand, though the ornamental variety has been grown more widely. However, the Mediterranean cypress may be a more useful tree for dry areas than the limited extent of planting suggests. In southern Europe the timber is durable and, being easily worked, has long been used for building and furniture.

Value of Cypress Timber

Information about the timbers of the cypresses dealt with in this article is not only meagre but somewhat contradictory. In Europe *Cupressus sempervirens* is important and in America Lawson's cypress is valued highly, but in New Zealand these timbers are little used and the most useful timber is undoubtedly that of *C. macrocarpa*.

[*Photo News Ltd. photo.*

GENERAL APPEARANCE: Wide, spreading crown. HEIGHT: 150ft. in Mediterranean region. BARK: Thin, smooth, and grey-brown, splitting slightly vertically. FOLIAGE: Branchlets alternate and spread irregularly. Leaves shorter than 1/16in., dark green, short, stiff, blunt, and furrowed; borne in 4 equal ranks, with tips not swollen. FEMALE CONES: Borne in groups of 3 or 4. Ovoid, 1 to 1¼in. long, shining brown or greyish; 8 to 14 scales. SEEDS: Smooth and narrow, without resin tubercles; 8 to 20 per scale.

The wood of Lawson's cypress is light in weight and colour, strong, and very durable, with a peculiar, lasting, spicy odour. It is used in North America for general building, interior finishings, flooring, boat building, and railway sleepers, but despite the high esteem in which it is held there little attempt has been made to grow it for timber in New Zealand, no doubt because in the time that Lawson's cypress takes to reach maturity two crops of *Pinus radiata* could be grown. Timber has been cut from old shelter belts, but no information is available about its durability beyond the fact that trees left lying on the ground have given sound timber after about 10 years' exposure.

In contrast to the untried timber of Lawson's cypress, the value of *Cupressus macrocarpa* timber is recognised by most New Zealand farmers. It is one of the most generally useful farm timbers, but is better grown under forest conditions in a block, as a single tree is likely to leave a large, useless stump, too knotty to be sawn up economically. Mature, well-seasoned timber can be used in the interiors of houses and for out-buildings and rough carpentry. It is excellent as fencing posts and strainers, as it contains a large proportion of heart wood and posts may last in the ground upward of 30 years without rotting. Side limbs in the round are often used as posts, and many farmers prefer these to sawn posts. Macrocarpa timber combines many good qualities, for though it is light in weight, it is hard, close grained, easy to work, strong, and durable. Lawson's cypress is more difficult to work because the oiliness of the wood tends to cause clogging of the tools. As fuel macrocarpa burns with a good heat, but as it sparks rather fiercely it must be used with care on an open fire.

Of the other species *Cupressus arizonica* and *C. lusitanica* are not important timber producers even in their native countries. They are used in New Zealand for general carpentry and fuel. *C. lusitanica* may prove a valuable producer of soft wood in high inland localities of New Zealand where its rate of growth is good and comparable to that in parts of South Africa.

Cupressus sempervirens has a light brown, close-grained timber which has been used for a long time in Europe for building. It is valued for the making of clothes chests, as the fragrant wood keeps away insects, particularly moths.

Little is known of the timbers of many of the cypresses as they are growing in New Zealand, but some of the less-known varieties may be capable of producing useful farm timber.

The Choice of Breed for Household Poultry Keeping

THOUGH the light breed White Leghorn of good strain is that most widely used on commercial poultry farms, it can be argued that the Black Orpington and the Rhode Island Red, both heavy breeds, better suit the general purposes of the household poultry keeper. However, in this month's article W. L. McIver, Poultry Instructor, Department of Agriculture, Hamilton, emphasises the importance of the strain within the breed rather than the breed itself.

THE household poultry keeper's aim in keeping fowls is a regular supply of fresh eggs, with the added condition, perhaps, that the winter supply is more important than the flush season. Most backyarders are not deeply concerned about the cost of production, even when they realise that their eggs are costing more than shop eggs, though only the original purchase price of the pullets and feeding costs are taken into account, the value of labour and housing being disregarded. Household poultry keeping should pay, but buying very expensive pullets which are laying or near the lay, as many people do, is not an economic way of obtaining eggs, especially if inferior housing or management permits egg yield to fall below average.

If 6-month-old pullets are bought at 27s. 6d. and they produce an average of 12 dozen eggs worth an average of 3s. 6d. per dozen, while feeding costs are 16s. per bird for the year, receipts total 42s. and outgoings 43s. 6d. per bird. The cash loss is 1s. 6d., but the live bird is still worth something at the end of the year—say, 6s. The enterprise has paid its way (disregarding the value of labour) only if all the birds are still living at the end of the period. If two have died out of twelve—and that is the average mortality rate which can be expected—the venture has lost money, and only if the householder regards the obtaining of eggs in the short-supply season as the important factor is the effort worth while. To those who take a pride in profitable poultry keeping the obvious recommendation is to buy younger and more reasonably priced pullets.

Advantages of Heavy Breeds

For winter production heavy-breed and crossbred fowls are better than light breeds, but the subject is complicated by several factors: First, the strain is even more important than the breed; second, the chicks must be hatched at a suitable time of year; and, third, the general management must be good.

An outstanding Rhode Island Red, a heavy breed which is third in popularity to the White Leghorn and Black Orpington.

All Orpingtons are not equally good, and neither are all Leghorns. In other words, there is no "best breed" for egg production. One breeder's strain may be far superior to another's. To attempt to compare a poor strain of Orpington with a good strain of Leghorn would be futile. The aim should be to ascertain the source of satisfactory strains and continue buying from the same source.

If the chickens are not hatched during the most desirable season, they will begin laying too late or too early. If too early, after a few month's production winter conditions are likely to bring about a partial or a full moult, with a serious effect on the egg yield for from 6 to 12 weeks, just when winter eggs are needed.

Mismanagement, including unsatisfactory feeding methods, may result in failure to obtain even average results from the best of stock.

Quietness and Broodiness

Quietness both in general character and in behaviour is another attribute desired by householders in their poultry. Heavy breeds are less scary in the laying house and more contented to remain within the confines of the run, but the fact that light breeds like to fly over fences is not necessarily a disadvantage. It may be a nuisance to the keen gardener, but it should delight the poultry keeper that the birds are good foragers. The timidity of fowls is largely a reflection of management, especially during the growing stage. All breeds of poultry, heavy and light, tend to be more timid when they are small framed and light for the average of their breed. Heavy-boned and weighty strains are much quieter. Some strains of Leghorns are just as tame and easy to handle as Orpingtons.

Heavy breeds are all liable to broodiness, which is why they are not more popular with commercial farmers, who do not like the extra work involved. The householder does not object to his one or two "cluckies" and, as a rule, is not even worried about his hens sleeping in the nest overnight. Many backyarders take no action to get birds over broodiness and do not object to the reduced egg yield. Though broodiness cannot be entirely bred out of heavy-breed varieties, it can be very much reduced by careful breeding.

Crossbred Strains

Birds bred from a heavy-breed bird and a light-breed bird give much the same results as heavy breeds, no matter on which side of the mating the heavy breed is used, though results tend to be better if the female is the heavy bird and less broodiness can be expected from such a cross. Crossbred birds are not necessarily mongrels,

[*Fraser Niederer photo.*

Crossbred pullets from a mating with a heavy breed on at least one side are becoming more popular.

but they are likely to be poor producers if care is not taken in the selection of the breeding pen—if, for example, poor-type Orpington females are mated to an inferior Leghorn male, or if a farmer pure-mates all his better females and cross-mates all the remainder, even though he uses high-quality males, contending that they will make up for the deficiencies of the females. Yet the chicks would look just as pretty as those from a good mating. An excellent male does not make up for shortcomings in the female.

Results, not appearances, are the yardstick of worth. When crossbred chicks are being bought it is even more important than with pure breeds to ensure that they are obtained from an excellent breeder with good laying strains and a reliable breeding programme.

All the apparent advantages of heavy breeds which have been quoted do not mean that they are necessarily more suited to household poultry keeping. Light breeds can be expected to lay better than heavy breeds in spring and summer, and usually they lay a greater annual total. They may be a little flighty, but management can rectify that. The laying house should never be approached or the door opened without the birds being given a warning by song, whistle, knock on the door, or talking, The novice can more easily recognise the early stages of sickness in a Leghorn than in heavy breeds. It is simple for the person without long experience of poultry to judge when a light-breed fowl is in lay, but much more difficult with heavy and cross breeds.

In some respects heavy breeds suit the backyarder better and in others the light breeds are better. Probably most evidence supports the contention that the breed of fowl to keep is the one the owner likes no matter whether it is the common White Leghorn or Black Orpington, the nearly-as-popular Rhode Island Red, or the less common Ancona, Minorca, Wyandotte, or Rock. Most important is to be proud of the birds and be able to get the best results from them.

Hop Production in Nelson District

HOP production in New Zealand is confined almost entirely to Waimea County, Nelson Province, a district which is largely given over to horticultural industries. This article by N. J. Adamson, Horticultural Superintendent, Department of Agriculture, Nelson, describes the extent of the industry, markets, prices, and general conditions.

HOP growing has been carried on commercially in Nelson since the earliest days of its settlement. For a number of years the acreage has been fairly stable between 650 and 750 acres; there were 109 growers in 1949. Outside of Waimea County there are only two small gardens, one at Takaka and one near Blenheim.

The Nelson district has proved suitable for hops mainly because of the usually favourable climate; rainfall is adequate during the growing period of September to January. Warm, dry weather prevails before harvesting to ripen the hops, and conditions are similar for harvesting during the latter part of February and through March, with a comparative absence of high winds. Usually harvesting proceeds without interruption. The general absence of high winds which can so readily damage hops, which are grown on a high wire trellis, is an important advantage. Hops rarely suffer wind damage in Nelson; many gardens have no shelter belts and shelter is not regarded as essential.

Many gardens are relatively small, but the areas cultivated by individual growers range from 2 to 30 acres. The table on this page gives the grouping of gardens on an acreage basis.

Hops are usually grown in association with other forms of farming such as fruit, tobacco, dairying, sheep, and general mixed farming. Very few instances occur where hop growing is undertaken as a sole occupation, although in a number of cases hop production provides the major part of the farm revenue. The choice of associated farming activities is influenced largely by location and soil types. Thus in the Riwaka and Motueka areas more instances occur where tobacco and hops are grown in association, while in outlying districts sheep and dairy farming may be combined with hop growing. As some of the soil types used for hops are also suitable for the growing of flue-cured tobacco, the alternative land usage has sometimes influenced a change-over to tobacco where difficulties have been experienced through root diseases in hops and in some cases where satisfactory harvesting labour has not been readily available. Labour is more difficult to secure at present than in former years owing to the alternative employment on tobacco and fruit providing a longer season as compared with the 4 or 5 weeks required for hops.

Vine of hops being lifted down to pickers.

The plants, which are perennial, are normally long lived and come into full production in the second year of establishment. Because a hop garden is expected to become as permanent an establishment as an orchard or vineyard, and because it consists not only of the established plants but of an expensive overhead trellising, the expense that would be involved renders change of site and rotation of cropping impracticable.

Selection of Site

Great care is therefore required in selecting a site for a garden. The cost of establishment is high and only the best land capable of heavy yields warrants the expenditure necessary for the erection of the wire trellising, drying kilns and other buildings, and pickers' accommodation. The best yields have been obtained from sandy loams of good depth which are well drained.

The normal growing season is from September, when shoots from the crown break through, until the end of February, when harvesting begins. During that period little extra labour is employed beyond the normal farm labour required in ordinary cultural practices. Stringing of the hop vines is sometimes done on a contract basis by very experienced men who may undertake the work on several gardens over a period of up to 3 weeks in October. Extra female labour is also engaged for 2 or 3 weeks following stringing in the initial training of the vines.

GROUPING OF HOP GARDENS IN WAIMEA COUNTY ON AN ACREAGE BASIS

	Under 3 acres		3 to 6 acres		6 to 9 acres		9 to 12 acres		Over 12 acres		Total		Average Acres
	No.	Acres	No.	Acres	No.	Acres	No.	Acres	No.	Acres	No.	Acres	
Motueka-Riwaka	4	8.59	22	99.73	14	103.20	2	22.49	9	150.73	51	384.74	7.53
Upper Moutere	4	7.92	16	69.63	6	38.60	—	—	1	13.79	27	129.94	4.81
Waimea Plain	7	15.48	19	78.58	4	28.32	—	—	1	12.41	31	134.79	4.34
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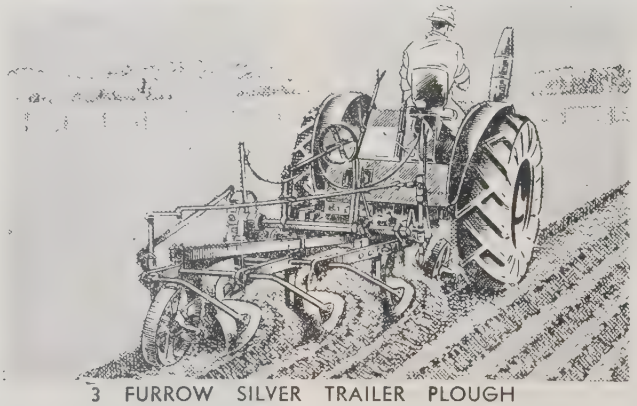

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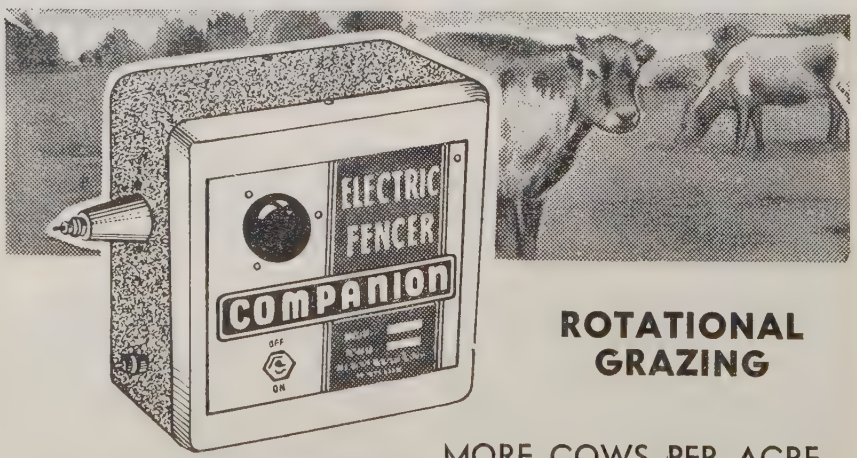

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In harvesting, drying, and baling much seasonal labour is required. All picking is done by hand and to meet the demand for pickers labour is brought in from other centres under arrangement with the Department of Labour and Employment. Some more experienced local labour is available and is used to the greatest extent, but with the increased demand for labour in fruit and tobacco crops, over a longer employment season, the amount of outside labour required for hops has increased until now the ratio of outside to local labour is 3 : 2. To provide for the increasing proportion of outside labour further accommodation is being provided. For an average garden of 6 to 7 acres accommodation for as many as 12 people may be required; 4 huts to take parties of 3 each are needed.

Perquisites are often provided for pickers and may cost as much as £2 per acre. They include firing, potatoes, other farm-grown produce, and milk for pickers for whom accommodation is found, and often tea, sugar, and milk for all hands at morning and afternoon "smoko".

Production varies considerably from garden to garden and can fluctuate considerably from season to season according to growing conditions. In the first season of planting a small crop may be produced, sometimes reaching 600 to 800lb. per acre. Production has been materially affected through root rot in hops in recent years and in some areas the replacement rate is high. Average production per acre over Waimea County was 1319lb. for the years 1941 to 1949. The wholesale price for the 1950 season under price control was 3s. 4½d. per pound for first-grade hops. Growers received this amount less 1½d. brokers' charge, which includes all selling costs such as grading, storage, insurance, handling in and out of store, etc., and a further deduction of 1d. per pound for research purposes.

Hops are not grown under contract, but all are marketed through the Hop Marketing Committee, which appoints agents and negotiates prices. A sole agency handles all Nelson hops and it is compulsory to deliver all hops to the appointed agent.

The Hop Marketing Committee with statutory powers consists of five elected grower members and a Government representative. The committee operates under the Hop Marketing Regulations made under the Primary Produce Marketing Act, 1936.

The principal buyers are the breweries in New Zealand. Any surplus may be packeted and sold to wholesale merchants for distribution or it may be exported. In 1948, 275 bales of about 300lb. each were shipped to Belfast, Northern Ireland.

Hops are graded by the brokers and are classified as first, second, or third grade according to quality, determined by colour, aroma, and general condition.

Upper—Rural scene in Riwaka district, showing crops of tobacco, hops, and fruit. Middle—A picking bin. Lower—A group of hop kilns with staff accommodation built under loading platform.

New Zealand hops compare more than favourably with hops grown in other countries and are sought after. They seldom show any wind scorch or browning.

Production

More recently production has been barely sufficient for New Zealand needs, but in favourable seasons a surplus may be available for packeting or export. Before the Second World War surplus hops were exported to Northern Ireland, Australia, and South Africa. A good export market exists and production could be increased to meet the overseas demand. Before the war export was resorted to mainly to dispose of surplus production and local sales were depended on as the main outlet. Growers were then concerned with securing a share of local sales, which were operated on a quota system. Local quotas were then a saleable asset worth as much as £5 a bale. At present, with local demands not always satisfied and a good export market available if required, quotas have lost most of their significance.

Hops are not regularly imported into New Zealand, but to make up a shortage in 1946, 300,000lb. were imported from California. On these an import duty of 1s. per pound was paid.

Government Assistance

The industry is assisted by the Government in several ways. Legislation has been provided to enable hop growers to control their marketing through a Hop Marketing Committee with statutory powers. Assistance has been provided in research by meeting the capital expenditure of a Hop Research Station (in process of establishment). The research organisation of the Department of Scientific and Industrial Research and the services of the Department of Agriculture in extension work are available to the industry.

Research Work

Hop research is being controlled and directed by a Hop Research Committee on which are represented the brewing interests, growers, Department of Scientific and Industrial Research, the Department of Agriculture, and the Cawthron Institute, with the Director of the Cawthron Institute, Sir Theodore Rigg, the present chairman. The secretarial work of the committee and general oversight of the affairs of the Hop Research Station are undertaken by L. W. Tiller, Deputy Assistant Secretary, Agriculture and Biology, Department of Scientific and Industrial Research.

The research programme includes work on hop diseases, nutritional problems, variety trials, and hop drying. The staff of the Cawthron Institute contributes to the work of hop research in several directions, including disease surveys and mycological investigations, soil investigations, and chemical work. The plant Diseases Division of the Department of Scientific and Industrial Research has also contributed in disease surveys and testing of materials for virus. The Physical Laboratory of the Department of Scientific and Industrial Research has undertaken research in hop drying. The Hop Research Station was recently acquired and is being organised, the work being under the control of the Director. The main activities of the station will include manurial experiments, selection, propagation, and breeding with the object of developing plants more resistant to disease, and a study of many cultural problems.

Future of Industry

The future of the industry is a little uncertain and expansion, or even maintenance of the present acreage, depends largely on the availability of seasonal labour, for which competition from the tobacco growing industry and fruit industry has to be met; also it is dependent on the success which may result from research in overcoming root rot disease. The alternative use of hop land for tobacco growing often induces growers to switch over to tobacco when production is threatened through disease or other causes or when hop picking labour is difficult to secure.

Photographs by National Publicity Studios, "Weekly News", and Ellis Dudgeon.

Left—Young vines appear in spring and are trained up strings attached to overhead wires. Right—Hop picking scene. "Pokes" of loosely bagged hops loaded for cartage to the drying kiln.

Value of Rhode Island Red as a Commercial Breed in New Zealand

THE ability of the Rhode Island Red to produce plenty of large, brown eggs during winter is fast becoming recognised by poultry producers in New Zealand. This, combined with the faet that the breed are also excellent table birds, has made them extremely popular with both large and small producers. This article by H. K. Mullins, Poultry Instructor, Department of Agriculture, Hastings, discusses the commercial potentialities of the breed in New Zealand.

An outstanding pair of Rhode Island Reds displaying excellent utility characteristics. Note the full black tail of the cockerel carried at the correct angle and the nicely rounded front on the pullet.

RHODE ISLAND Reds are a handsome American breed which originated from the crossing of the Red Malay Game fowl with the native hens of Rhode Island and the rose-combed Brown Leghorns with mottled females. When first introduced into New Zealand early in the twentieth century they met with a rather mixed reception from commercial farmers and exhibitors. These birds were more of a buff hue with considerable "smut" or smoky undercolour and were not unlike the New Hampshire bird of today. In recent years the advancement of the Rhode Island Red has been extremely rapid, particularly on the show bench, and it is now a common sight to see the heavier classes filled by this breed.

Productive Ability

Though the Rhode Island Reds have not yet seriously threatened the position of the White Leghorn and Australorp as the main utility breeds in New Zealand, there is every indication that the breed is now being kept on more commercial farms than before the war. Hatcheries supplying day-old chicks of this breed confirm the fact that the demand for stock over the last 3 or 4 years has been greater than at any other period. This suggests that the public are looking for a bird which will produce well during winter and at the same time provide an excellent table carcass.

Rhode Island Reds are a hardy breed and great foragers. Consequently they are particularly popular with farmers where free range is available for the birds at all times. Another pleasing factor about this breed is their extreme docility, and in most cases a 3ft. netting fence is sufficient to keep them off the vegetable garden or permanently enclosed.

The laying ability of the Rhode Island Red has been clearly demonstrated in laying tests in New Zealand and abroad. In Britain a Rhode Island Red pullet laid 318 eggs in 336 days, and the reputed American record for the breed is 358 eggs in 365 days. At the last New Zealand heavy-breed laying contest Rhode Island Reds averaged well above 170 eggs per bird, one bird putting up the fine score of 239 standard-weight eggs.

Slow Maturity

A drawback in the past with the average Rhode Island Red strain in New Zealand has been slow maturity, and when it is considered that it takes the average Rhode Island Red pullet from 7 to 8 months to come into

An attractive breeding pen of utility Rhode Island Reds.

production it is understandable why so many producers have retained the quick-maturing White Leghorn as the main breed. Fortunately quite a number of producers have endeavoured to overcome this fault, with the result that there are now numerous strains available which will mature as rapidly as the Australorp and other heavy breeds. However, the slow-maturing bird has one point in its favour, and that is its ability to begin laying medium and standard-sized eggs. That compensates to some extent for the extra cost involved in rearing it to 7 or even 8 months.

Selection of Breeders

Most breeders of Rhode Island Reds are agreed that it is extremely difficult to breed for colour, type, and eggs in a flock, and that once these are achieved they are still harder to retain. Breeding pens which to the novice appear to be ideally mated may throw a predominant number of cockerels that are heavily striped in the neck hackle, or pullets which are carrying excessive peppering of black on breast or wing bows. It is remarkable that the nondescript appearance of many commercial flocks of Rhode Island Reds has not detracted from the popularity of the breed. If this popularity is to be retained in New Zealand, more care will be necessary when selecting for the breeding pen than has been taken in the past. Only birds which measure up to a reasonable standard and weight should be bred from. The long, narrow-feathered, chocolate-coloured bird should not be tolerated on any commercial establishment, for this type usually has a long, snaky head, hollow face, and coarse legs which are detrimental factors for good producers. A broad, flat feather with a good healthy sheen to it is more indicative of a layer than the dull, dry type which so often indicates lack of stamina. Excessive "smut" or smoky grey in the undercolour is an undesirable factor, but a little can be tolerated in individual birds if the top colour has a tendency to be buff rather than a rich, even red. Good type is an important factor and should always be carefully adhered to. A broad, oblong body is essential, and the back should be long and horizontal. The correct tail is not easily obtained in Rhode Island Reds and many show winners have that long, whippy appearance which is more characteristic of light breeds than Rhode Island Reds. The tail in both males and females should be black or beetle green, well spread, and carried at an angle of 40 degrees. This will produce a bird which is perfectly balanced, alert, and quick of movement—essential points in any well-mated breeding pen. The breast is another important factor in the type of Rhode Island Reds. A broad, deep breast is essential for good lung and heart action and contrasts sharply with the narrow, cut-away type of bird which is so often lacking in stamina and therefore longevity. The ideal conformation is a breast which, while being broad and deep, is carried in line nearly perpendicular to the base of the beak with the end of the keel or breast bone just below the crop.

Other defects which should be carefully guarded against are:—

Feathers on shanks or feet.

Badly lopped combs or side sprigs on the comb.

Eye or eyes which are any other colour than red or orange.

Coarseness or superfineness.

The weights set down under the 1934 New Zealand Utility Poultry Standards are as follows:—

Cocks 8lb. to 9½lb.

Cockerels 7lb. to 8½lb.

Hens 6½lb. to 8lb.

Pullets 5½lb. to 7lb.

These weights should be borne in mind when the final selection for the breeding pen is being made.

Hatch Early

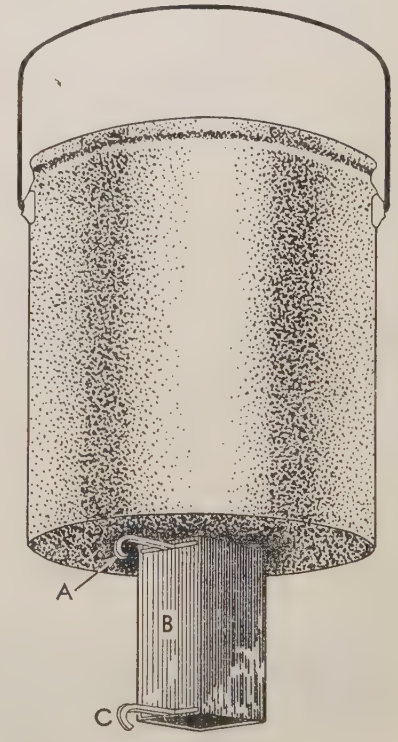
A question commonly asked is when is the ideal time to hatch Rhode Island Reds so that the maximum growth can be obtained and at the same time avoid a neck moult in autumn. The late-hatched chickens of any breed seldom do well and Rhode Island Reds are no exception. Possibly the most appropriate time in which to hatch the bulk of the young stock is August, and this date is preferable to September and definitely superior to October for hatching Rhode Island Reds. If pullet breeding—never a recommended practice—is being carried out, it would be advisable to hatch the replacement stock in July, as these would neck moult in autumn and begin laying full-sized eggs on return to production.

Management of Young Stock

It is now common knowledge that diseases such as worms and coccidiosis are contracted through birds running on stale ground which has become devoid of all signs of grass or greenfeed and on which manure has caked and built up through successive batches of chicks running on the same patch month in and month out. Consequently the chickens should be given the best possible start by removing them to a colony house on fresh ground once they are off heat at 5 or 6 weeks and have been thoroughly hardened off in the brooder house. Old runs should be limed and dug over in autumn. The sun is the best germ eradicator and will accomplish more in this respect than any disinfectant. Careful observance of these points will assist considerably toward retarding an outbreak of disease and give the young Rhode Island Reds a good start. Information about a plan for a summer colony house may be obtained from Poultry Instructors of the Department of Agriculture.

Method of Feeding Cows in Bails

THE simple feeder illustrated was made by a farmer for about 5s., and its value in man-hours has proved its worth for feeding concentrates during milking. Most farmers have a 4-gallon oil drum which is used to hold the concentrates while the allowance for each cow is filled into the container below it. A square container beaten out of sheet metal 9in. long and 4in. wide is brazed to the base of the drum. Two movable sheet slides are placed in the container, one in the upper and one in the lower end, to allow the required amount of concentrates to be fed to each cow. The feeder is suspended from the roof and hangs over the feeding box at the head of each bail.



Device for feeding cows in bails. A—Slide for filling measure B. C—Slide to fill feeding box.

As each cow is brought in to be milked its ration of concentrates is released into the feeding trough by opening the lower slide. The container is filled by opening the top slide and the next cow's rations are ready to be released. Enough concentrate can be fed from one filling of the drum for 8 cows, giving each cow about 2lb.

The advantages of this type of feeder are that it is not a permanent fixture and therefore collects no dust, and on removal after each milking is not an attraction for birds. Also, during the period when bail feeding is not necessary, it can be stored away.

—T. BUGG, Assistant Inspector of Stock, Department of Agriculture, Palmerston North

Adding Humus to Orchard Soils in Hawkes Bay

ONE of the main problems of Hawkes Bay fruit growers at present is orchard soil management, and there is appreciation of the need to do something more than has been done in the past to maintain a satisfactory state of soil fertility in the interests of tree health and a rapidly growing desire to do what is required. Much is being accomplished, especially in respect to the addition or utilisation of humus and nitrogen-forming materials. In this article by T. Conway, Orchard Instructor, Department of Agriculture, Hastings, an indication is given of present trends among Hawkes Bay growers to achieve improvement in soil management.

[*Sparrow Industrial Pictures Ltd. photo.*

Natural weed growth in an orchard; although of some value, it is not so beneficial as a specially sown crop.

THERE is fairly general agreement, and evidence to support the contention, that the principal requirements of orchard soils in Hawkes Bay are humus and nitrogen, possibly the main limiting factor being insufficient humus.

Although the orchard soils mostly are friable, deep, and fertile loams, they have been subjected over a long period to considerable exhaustion of their natural fertility as a result of the production of heavy crops of fruit, excessive cultivation, and exposure of the cultivated surface to long, dry, and hot summer conditions. This constant exposure of the soil to high temperatures for long periods of little rainfall no doubt has contributed largely to the loss of humus in the soil, which in turn is affecting its fertility and moisture-holding capacity.

Under the light rainfall conditions of Hawkes Bay it is essential that soil humus content be held at a very satisfactory level so that the moisture-storage capacity of the soil can operate at its greatest efficiency. This is now being appreciated by growers as is the fact that ample humus is important in the full utilisation of any fertilisers applied to orchard soils.

The value of green cover cropping, mulching, etc., should not need to be stressed, but the matter is of vital importance to the maintenance of satisfactory and economical production.

The prevalence of minor-element deficiencies, particularly of manganese, has caused concern in recent years and it is possible that considerable improvement could be effected if growers concentrated on building up the humus content of their soils, thus doing much to make minor elements more readily available to the trees.

The addition, as required, of nitrogen, phosphates, and potash to orchard soils is simply a matter of applying one or more of the commonly used fertilisers, but the main concern of growers is the best method for the most economic and convenient usage of humus or organic-forming materials.

Objects and Trends

The process of green cover cropping to incorporate into the soil the material produced has much to commend it. It is an economic and efficient method of building up organic matter in the soil, but under orchard conditions it has certain disadvantages which incline growers to seek other methods of soil improvement. The main complaints have been poor seed germination owing to dry conditions, poor growth (particularly of blue lupins) due to tree shade and disease, damage to the cover crop during harvesting and spraying, and the objection of fruit pickers to the wetting effects from cover crops during late harvesting operations.

Although many growers still do green cover cropping, others favour the use of various mulching materials such as straw, hay, pea vinings, and sawdust, or the application of as much sheep or poultry manure as is available. Others are more interested in the possibilities of semi-permanent or permanent cover crops of clovers and grasses, etc., throughout their orchards. The last alternative may have distinct possibilities and is in line with recent investigations and trends both in New Zealand and overseas. Under the low-rainfall conditions of Hawkes Bay, however, growers will need to act with caution until further investigations have been made and the best technique has been evolved. Small trial areas on individual orchards must be the first step, and the possible need for co-ordinating irrigation equipment with semi-permanent or permanent cover crops must not be overlooked.

Methods of Soil Improvement

The main trend therefore is toward the natural regeneration or maintenance of soil fertility within practical limits. As an indication of the soil-improvement methods at present being adopted by Hawkes Bay fruit growers brief details of each are given.

Green Cover Crops

Blue lupins: The New Zealand blue lupin has been freely used for green cover cropping of orchards for many years, and its high merit for this purpose is fully recognised. However, in recent years it has lost much of its popularity because of poor coverage resulting from poor seed germination, poor growth, and disease.

It is advisable to sow blue lupins during January or February, but the dry conditions usually experienced during this period tend to affect germination seriously. Furthermore, the large trees in Hawkes Bay orchards create considerable shade, and as the blue lupin does not thrive under shade, the effect on the crop is quite marked when it is sown among fully bearing trees. The lupin crop often becomes badly damaged during harvesting and spraying operations.

Many failures appear to occur, however, as a result of lack of preparation

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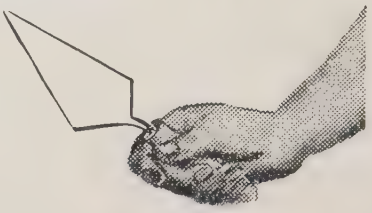

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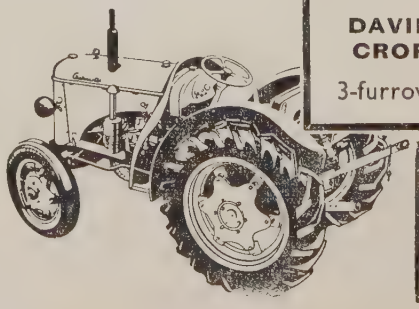

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and consolidation of the soil before sowing, sowing too deeply (particularly when cultivating in after broadcasting the seed), neglect to apply superphosphate at the time of sowing, use of insufficient seed, and lateness of sowing.

It is advisable to prepare the soil to a reasonable tilth before sowing and to ensure that sufficient consolidation has taken place to draw the soil moisture close to the surface layer. Lupin seed can be broadcast or sown by coulter drill in two directions through the orchard to give as complete a coverage as possible. If the latter method is used, at least 2 bushels of seed and 2cwt. of superphosphate per acre will be required. If the seed is broadcast, a very light discing or a harrowing with tine harrows usually will cover the seed sufficiently. It will be found that the best crops generally are obtained from sowings in January, although February sowings should be satisfactory.

If it is found that ample consolidation of the soil has not been achieved, it will pay to run over the area with a Cambridge roller either before or after sowing the seed.

The blue lupin crop is too valuable for orchardists to discard it and it is considered that if the recommendations given are followed, it would soon regain its lost prestige.

Barley: There is no doubt that of the cereal crops barley is the most commonly grown for green manuring. It has the advantage that it can be sown much later than blue lupin, usually during March and April, and therefore does not interfere to the same extent with orchard operations. Seed is sown at the rate of 1½ to 2 bushels per acre, and similar methods are followed as recommended for blue lupin. Black Skinless is the variety commonly used. The application of fertiliser at the time of sowing is important for best results with all cereal cover crops; for barley 2cwt. of superphosphate and 1½cwt. of sulphate of ammonia per acre is recommended. The addition of a further 1½ to 2cwt. of sulphate of ammonia per acre when turning in the crop assists in decomposing the material and benefits the trees.

Oats: Occasionally, Garton oats are used as a cover crop and are sown in the same manner as barley. Oats are less popular than barley, as they react fairly badly at times to winter weather. If oats are combined with tares, however, a very good stand of green material can be provided.

Ryecorn: In the last few years considerable interest has been shown in the use of ryecorn in place of barley. Ryecorn, which is treated in the same way as barley, has the advantage of hardiness during winter and the capacity to produce quickly a good dense bulk of material containing much coarse fibre toward maturity which decomposes more slowly than other cereals. Good root development is also a feature of this crop.

In the early stages of growth ryecorn stools out in more prostrate form than barley and becomes very dense.

Tares: It is the writer's opinion that the value of the cereal crops mentioned would be improved by the addition of a small amount of tares. These combine well with cereals, the latter providing support for the more delicate or vinous growth of the tares. The combination provides a dense mass of growth, and as the tares are legumes, the cover crop has a two-fold advantage. However, in recent years tare seed has been scarce, but if seed merchants were sure of a reasonable demand for the seed, no doubt this position could soon be rectified. A good mixture would be 1½ bushels of barley, oats, or ryecorn and ½ bushel of tares.

[*Sparrow Industrial Pictures Ltd. photo.*

A good cover crop of blue lupins is one of the best means of improving the soil.

Weed growth: A number of growers rely on the natural weed growth which arises after the cessation of cultivation for the season. In many cases this growth is fairly extensive and a considerable bulk of material is later cultivated into the soil. Many of the weeds, however, are very succulent and lack the fibre of recommended cover crops. Although of some advantage to the soil, weed growth is not as beneficial as one of the normal cereal or leguminous crops. If reliance is to be placed on the volunteer weed growth, it is advisable to apply 2 to 3cwt. of superphosphate per acre at the final cultivation to encourage growth. The trees will also receive benefit from this application.

Turning in of cover crops: The cultivation of all of the cover crops mentioned into the soil should take place at least a month before fruit tree blossoming, or decomposition may detrimentally affect the trees at a vital period. Apart from the toxic carbon dioxide gases given off during decomposition there is a temporary loss of nitrogen due to the biological activity in the soil. This loss can be offset largely by the application of nitrogenous fertilisers such as dried blood or sulphate of ammonia just before the green crop is cultivated in. Discing in of cover crops is the method now most commonly used. As the green material is thoroughly mixed with the topsoil, decomposition is expedited, and the material is well dispersed. The method is proving quite satisfactory and has many advantages over ploughing.

Farmyard Manure

Sheep manure: The large sheep population of Hawkes Bay provides a valuable source of organic fertiliser and humus in the form of sheep manure. This is obtained by growers from freezing works, railway wagons, stockyards, shearing sheds, scouring works, etc. All available supplies are utilised and the main cost is in carting and in spreading the material around the trees. Applications usually vary between the equivalent of 1 to 2 sacks per tree each season or in alternate seasons. Only one application is made in any one season, and, if possible, this is made in spring, but often growers apply the material as deliveries are received.

Fowl manure: All available fowl manure is also utilised by fruit growers as a fertiliser and humus-forming material. It is well dried on receipt at the orchards and often contains a considerable amount of straw and other organic material. It is spread around the trees at the rate of approximately 1 sack per tree. Usually only one application per year is given, and although spring is preferred for this, the time of application is often dependent on the date of delivery.

Mulching

Hay: Hawkes Bay is noted for the production of large quantities of grass and clover seed and it is possible for fruit growers to procure considerable quantities of threshed baled hay and occasionally stacks of old and partly rotted grass, clover, or lucerne hay in baled condition.

There has been a fairly pronounced trend recently toward mulching orchards with this type of material, and large stacks awaiting spreading have been seen in many orchards.

The price to the grower for fresh threshed hay is usually the cost of baling plus cartage to the orchard. On

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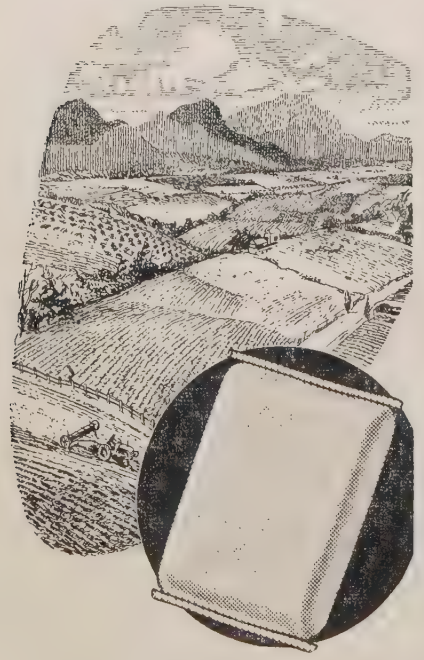

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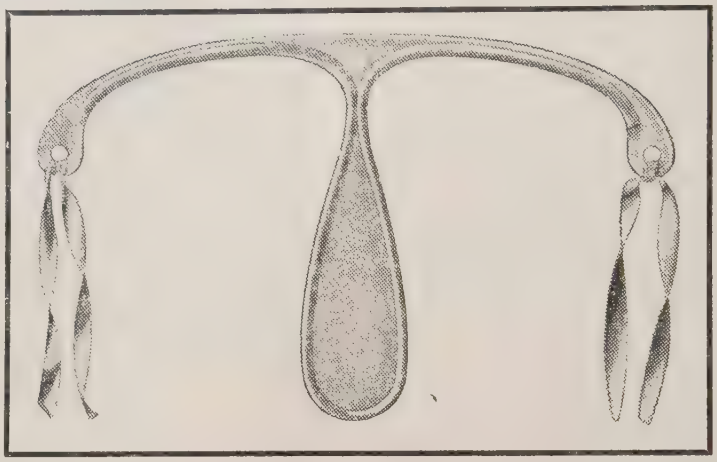

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top of this is the cost of carting out and spreading in the orchard. Some saving in subsequent cultivation costs tends to offset this expenditure.

Delivery of the material is made to orchards during summer and early autumn, and the spreading of it around the trees is given attention in late autumn or early spring after ample rain has fallen to soak the soil. Although it is considered that preliminary discing of the soil to a good tilth is a distinct advantage, this is sometimes omitted and the mulch is placed on relatively firm soil with considerable weed coverage. The latter practice is considered very undesirable.

To date application has varied between 1 and 3 bales per tree, although in some cases this has been exceeded; 1 to 2 bales have been used for tree or row mulching and 3 to 4 bales per tree for complete hay mulching.

Although the total cost in any one year is fairly high and the work takes considerable time, it is realised that the cost can be spread over more than one season, as the benefits persist over a fairly long period and cultivation costs are reduced.

Heavy straw mulching in an orchard. Straw should be spread after ample rain has fallen to soak the soil.

An application of nitrogenous fertiliser (2cwt. of sulphate of ammonia per acre) at the time of laying down the mulch is an advantage in expediting the process of decomposition and offsetting temporary loss of nitrogen in the soil.

Replenishment of the mulch is necessary periodically to maintain depth and cover. The mulch suppresses weeds, conserves soil moisture, adds organic matter, improves soil texture, and reduces soil temperature variations. From experience to date the fire risk is remote and can be guarded against.

Straw: As only a small acreage of cereal crops is grown in Hawkes Bay, relatively little baled straw is available to fruit growers. However, some of this material is used in orchards in the same way as threshed hay. Though it takes a little longer to break down than hay, owing to its coarser nature, it is not the less satisfactory for this reason. In fact, the coarser fibre in straw gives it some advantages over hay and it is less apt to produce seedling growth from waste seed.

Pea vining refuse: The extensive production of green peas in the district to supply the local cannery provides a valuable source of humus-forming material. The peas are mown while the plants are still green but at a stage when the pods are well developed. The whole of the top growth is stacked on motor lorries at the farms and transported to the cannery, where the material is unloaded on to large vining machines for the extraction of the green peas. Some vining is also done by portable or stationary plants operating on the production areas.

After passing through the viners the large quantity of plant refuse must be carted away and disposed of. It is available to fruit growers and is used to some extent in orchards.

This material decomposes rapidly and causes a most unpleasant odour when doing so. For this reason it cannot satisfactorily be stacked in large heaps for spreading as a mulch at the convenience of a grower. As fruit growers are busy attending to many other orchard operations, such as thinning, spraying, and harvesting, during early summer, when the pea vine refuse becomes available, little time can be found to make full use of the material. Used alone or preferably in association with other coarser material such as straw, pea vining refuse provides a very satisfactory mulch.

Compost: Although well-made compost is an excellent medium for improving the soil, its use under commercial orchard practice in Hawkes Bay is practically negligible. Growers feel that the cost of preparation and handling is too high on large areas. If ample supplies were available at a reasonable price, however, considerable use might be made of it. It is understood that one of the freezing works plans large-scale production of compost.

Sawdust: There is a plentiful supply of sawdust of all types available in the district, and this is quite handy to some orchard areas. A few growers have taken advantage of the supply and have mulched parts of their orchards with sawdust. If used in fairly large quantities, this material while decomposing draws heavily on the nitrogen in the soil at the expense temporarily of orchard trees. It is advisable therefore to use heavy applications of nitrogenous fertilisers at the time of mulching with the sawdust to offset loss of nitrogen. If insufficient nitrogen is available, the sawdust tends to decompose very slowly.

In reporting on a sample of fairly old *Pinus radiata* sawdust, the Rukuhia Soil Research Station indicated that the carbon-nitrogen ratio was 298 : 1. To prevent nitrogen deficiency it was advisable to bring the ratio down to 20 : 1. To do this it was assessed that every 100lb. of the sawdust required the addition of 2½lb. of nitrogen, which could be supplied by adding 12½lb. of sulphate of ammonia to the 100lb. of sawdust. This illustrates the extent to which withdrawal of nitrogen from the soil can occur when sawdust mulching is done carelessly.

Provided ample nitrogen is added, and sawdust is used in moderation, no undue detrimental effects should result. There do not appear to have been any unfavourable reactions so far from its use on orchards in Hawkes Bay. At the same time growers should exercise considerable caution in its use while there is a lack of experimental evidence of its value and effects under orchard conditions.

For instance, it is thought possible that it may foster the introduction of root-rotting fungus *(Armillaria mellea)* which can cause debilitation and loss of trees.

Seed-cleaning refuse: The large quantities of grass and clover seed grown in Hawkes Bay are finally put through various seed-cleaning plants operated by seed merchants, and from these plants a considerable amount of refuse in the form of grass, clover, and weed seeds and plant trash is recovered after the cleaning process. Refuse is collected in bags and usually destroyed or thrown away.

A few fruit growers have begun to use this material as a mulch in their orchards with very encouraging results. The material is delivered in sacks and is easily spread. As it is very fine, it breaks down rapidly and forms a most satisfactory humus layer over the soil surface. Much of the grass and clover seed also germinates and forms a dense sward which makes additional material for humus. The one disadvantage would appear to be the possibility of introducing semi-noxious weeds into an orchard soil, but so far this has not happened.

Permanent or Semi-permanent Cover Crops

There has been much concern recently among a section of fruit growers that excessive cultivation of orchard

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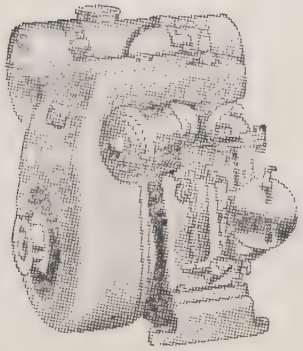

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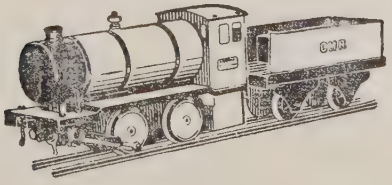

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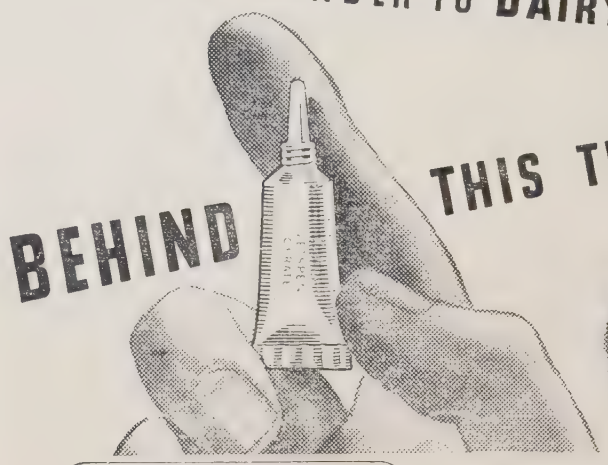

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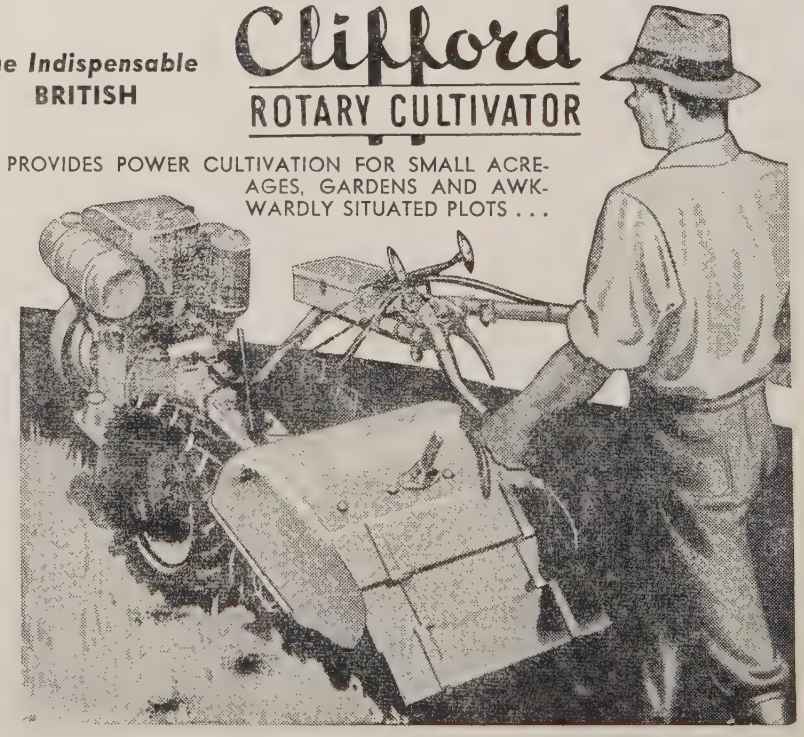

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soils contributes largely to a progressive development of fruit tree debility. Therefore there has been a trend toward either a considerable reduction in the period and intensity of cultivation or the laying down of orchards in permanent or semi-permanent cover crops.

As it would appear that local conditions play an important part in the success or otherwise of permanent or semi-permanent cover crops, growers have restricted their activities meanwhile to small trial areas. This is wise, as the relatively low rainfall of the district may allow a lush cover crop, perhaps in spring, to compete with the trees for the available soil moisture at an important time. This may apply more during the earlier years of establishment of the cover crop until the humus content and thereby the water-holding capacity of the soil have been built up. On the other hand, if irrigation facilities are available, safeguards could be taken to offset possible loss of moisture.

The proper method of handling the cover crop in other respects, such as mowing, mulching, fertilising, reseeding, cultivation, etc., also needs special consideration. As yet there appears to be no hard-and-fast rule relating to these practices, and a good deal of common sense and trial is essential to establish the best technique.

Developments along these lines in Hawkes Bay are still in the early stages and few growers are yet prepared to adopt any revolutionary changes, although much thought is being given to improving present methods.

Most interest is being given to the following procedures:—

Cowgrass and Montgomery red clover: These two clovers, which are very similar, are being used as a permanent cover crop among which a natural cover of grasses also develops. As top growth is made frequent mowing with gang mowers is necessary to prevent excessive uptake and transpiration of moisture through lush top-growth and to assure the welfare of the clovers. Mowing is more necessary during the summer period when dry conditions are likely.

Adequate fertiliser application appears to be advisable, and the results of trials carried out at East Malling Research Station indicate that an application of 5cwt. of sulphate of ammonia per acre should be very beneficial to the trees. Although it would seem that the maintenance of clovers in the sward would assure a self-sufficiency of nitrogen, it appears that the addition to the trees of artificial nitrogen is desirable, especially over the early period of establishment.

White clover: The possibilities of using white clover in conjunction with self-sown grasses and other clovers are also being tried. Management will be much the same as for Montgomery red clover or cowgrass. However, white clover develops a denser and shorter sward than cowgrass or Montgomery red clover and may not require the same amount of mowing, but at least one or two summer mowings should be necessary to shorten

Lush growth of subterranean clover used as a cover crop.

competing grasses to give the white clover a chance to come through satisfactorily.

White clover seed is used at the rate of 4 to 5lb. per acre with the addition, if desired, of 1 bushel of Italian ryegrass. This mixture would probably be improved by the addition of a small amount of cowgrass or Montgomery red clover to provide extra cover during the early period of establishment. East Malling Research Station has had promising results from a mixture of 20lb. per acre of three clovers and three fine grasses.

With all permanent cover crops the land requires to be well levelled and worked down to a fine tilth before sowing to provide a good surface for subsequent mowing.

Subterranean clover: Consideration is also being given to the sowing of orchard areas in subterranean clover on the lines of the trials carried out in Nelson. ("The New Zealand Journal of Agriculture", June, 1949, p. 577.)

Seed of the Mt. Barker strain of subterranean clover is sown in January or February at the rate of about 5lb. per acre. This can be used alone or in conjunction with 1 bushel of Italian ryegrass per acre to provide extra cover and bulk of green material during the first season. A fertiliser application of 2cwt. of superphosphate per acre is very beneficial. A lime application may also be necessary, but this will depend on earlier soil management.

If germination is satisfactory, a good cover of growth should be established during winter and spring. By the end of October or early November the clover should have seeded and the whole area is then given a rough discing and later additional cultivation. This cultivation is continued until the end of January, when with the first rains the natural reseeding will germinate and once again is allowed to develop a lush growth over the subsequent winter and spring months. This process is continued each year without further sowing of seed.

Subterranean clover has the capacity to thrive under relatively dry conditions and therefore may be of some importance in orchard practice under Hawkes Bay conditions. Unless irrigation facilities are available, however, there may be considerable loss of moisture to the trees during spring, especially during the early years of establishment, if dry spring conditions prevail.

Subterranean clover has the added advantage of playing an important part in preventing erosion on sloping or hilly orchards.

It can also be treated as a mown crop as with other clovers and in this case possibly the later-flowering and prolific-seeding Tallarook strain may be preferable.

Evidence suggests that a partial initial check to the fruit trees is almost inevitable when permanent cover crops of any type are laid down, but that trees soon recover from this check. Furthermore, care must be taken to see that trees do not suffer through lack of nitrogen and moisture. If grasses are used in the sward, and usually these come naturally if not sown, vigorous grasses such as cocksfoot must be avoided or suppressed.

Experiments so far carried out at East Malling indicate that the future of fruit tree nutrition may be in the development of the use of permanent swards. The aim would then be for a soil to be self-sufficient and in good stable condition by the supply of nitrogen and organic matter from the basically leguminous sward. At the same time the availability of the soil nutrients to the trees would be improved and good soil structure retained.

Consistent Attention to Soil Management

To planters of new orchards it can be said that the maintenance or increasing of organic matter in the soil should be given proper and consistent attention from the time the trees are planted. It is bad policy to exhaust the soil over a period of years and then have to attempt some drastic form of rehabilitation many years later. Any improvement then becomes a fairly slow process and much harm may have been done to the orchard trees meanwhile.

Every effort should therefore be made to develop a sound policy in respect to organic matter, soil fertility, and moisture conservation from the start. Growers will need to consider new trends carefully in relation to their own local conditions, but at the same time keep an open mind and not be averse to carrying out small trials along unorthodox lines as thought advisable.

Mechanical Loading in the Apiary

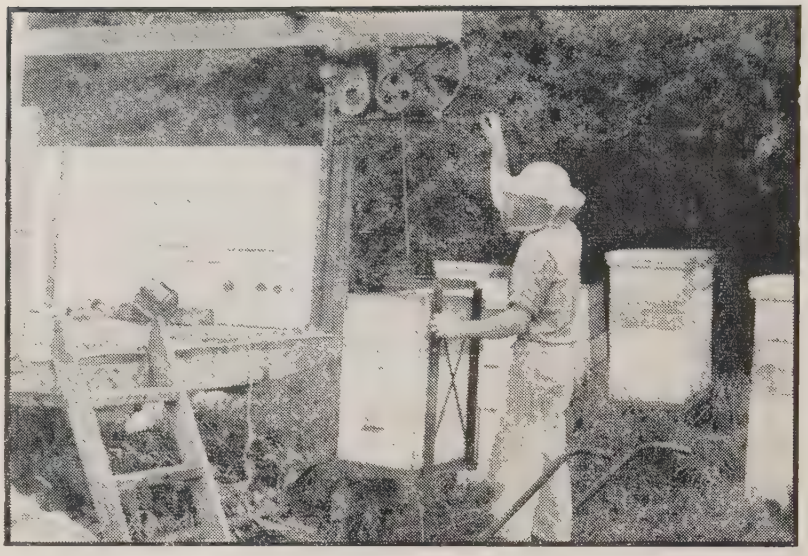
PROGRESSIVE beekeepers are constantly devising ways of alleviating the heavy work associated with commercial beekeeping. A loading elevator, devised by Mr. G. Corlett, a commercial beekeeper of Gate Pa, Tauranga, is described in this article by R. Goddard, Apiary Instructor, Department of Agriculture, Tauranga.

THE appliance is used mainly for unloading and loading supers of honey, but it can also be used with equal success in the shifting of hives. Supers of honey can be raised quickly and deposited with a minimum of jarring. Breakages of new combs heavy with honey have been reduced considerably since the machine has been used and beehives have been shifted with a minimum of disturbance; in some cases hives three storeys high have been moved by one man to different locations, normally an impossible feat.

The honey is taken off the hives by the use of escape boards or by brushing the bees, and the supers are stacked three high on a wooden platform. On this platform a drip tray is placed to prevent honey leaking over the floor of the truck. If robbing is prevalent, gauze screens or escape boards are placed over each pile of supers. Usually, all honey ready for extraction is taken off the hive and stacked before loading begins.

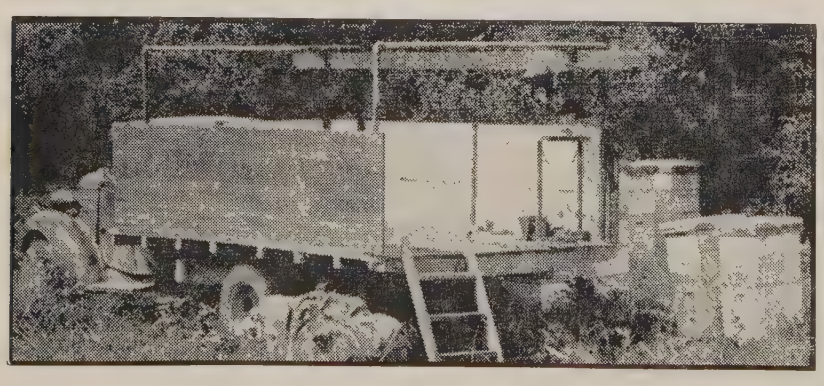
Method of Operation

The supers are first wheeled to the back of the truck and then, as shown in the upper photograph on this page, the sling is placed under the supers and the machine set in motion. When the supers have been lifted clear of the floor of the truck the operator releases the handle, which automatically disengages a friction drive, and the weight of the engine presses a rubber brake against the outside of an 18in. pulley, thus locking the load. A slight push is all that is required to slide the load along the travelling rail to the desired position for lowering.



Sling under supers, and the beginning of the lift.

Above—Load lifted clear of truck tray and ready to be pushed into position. Below—Truck and lifting apparatus.



Overhead Travelling Rail

The two arches on which the travelling rail is mounted are of 1½in. galvanised-iron piping fitted with flanges at the bottom which are bolted to the truck body. To allow the travelling rail to slide freely across the body of the truck two pieces of 2in. galvanised piping 20in. long fit loosely over the horizontal bars. The travelling rail is constructed of 6in. x 2in. heart rimu with a length of 4in. x ¼in. flat steel bolted to the underside, thus forming a 1in. ledge on each side. The carriage is bolted to 4 ball races, which allow free running on the edges of the travelling rail. At each end of the rail there is a rubber buffer which prevents the carriage running off and also acts as a cushion to prevent jarring or bumping of supers.

Engine and Winch

The motor is of 1 h.p., air cooled and petrol driven. The engine base is carried through to the opposite side of the centre mounting and is hinged with a pin to the bottom of the main frame or centre mounting. This extension forms the control handle which when pulled down raises the motor and thus brings the friction drive on the engine into mesh with the 18in. double A-section pulley mounted on the top shaft of the winch reduction gear. A ratchet on the side of the motor gives the half-way position between driving and braking and allows the rope to be unwound from the drum when unloading or loading. The winch drum is 3in. in diameter and 4½in. long. The motor revolutions are 700 per minute, the top shaft 150, and the drum 30.

The sling is constructed of 2in. x ¼in. flat steel.

The illustrations show a home-made set up which works well and which may be followed to construct a similar loading device, using standard equipment where possible.

Photographs by Rendell's Photo Service.

Trends in Hay Production in the South Island

IN last month's issue of the "Journal" officers of the Extension Division gave reasons for the differing trends of lucerne hay production in the North Island. This, the concluding part of the article, explains trends in the South Island, where between 1933 and 1944 there was a substantial increase in the area of lucerne grown for hay.

BETWEEN 1927 and 1933 the area was about 16,000 acres, but between 1933 and 1944 the acreage increased rapidly to 33,000.

There is a greater necessity in the South Island for the provision of high-quality winter fodder than in the North Island, because of the longer period during winter when pasture growth is at a standstill. Also the dry summers over a greater portion of this island call for the provision of some supplementary foodstuff not only to maintain dairy production during this period, but also to provide fodder for lamb fattening.

Farm mechanisation has probably developed more in the South Island than in the North Island. This mechanisation has included haymaking equipment which has removed the drudgery from the lucerne field. The climate, too, is generally more suitable for haymaking for a longer period than in the north.

These observations explain in general terms the reason why lucerne growing has expanded so greatly in the South Island while in the North Island the acreage has been reduced. District trends are now discussed.

Marlborough

Marlborough is probably the one place in New Zealand where lucerne can be grown widely without any great preparation of the land, and yet, strangely, the area in this district devoted to lucerne has remained more or less constant. Marlborough has been known as the home of lucerne, and a substantial quantity of the seed required for the rest of New Zealand is harvested in this district. The fact that many Marlborough farmers are doing reasonably well financially without the return obtainable from lucerne is the reason for the acreage not being increased. Many of the holdings in the district are relatively large, and this also contributes to some farmers' success without assistance from lucerne.

Nelson

In the Nelson Land District the area in lucerne has been increased from 300 acres in 1928 to almost 1000 acres in 1947. The greatest area of lucerne is to be found in Waimea County, but there is room for expansion in the Collingwood district, as the soils and climate there are suitable for lucerne growing. In other parts of the territory conditions are not at all suitable for this crop.

North Canterbury

It is in North Canterbury that the greatest increase in lucerne acreage has been shown. In 1928 the eight counties of this area grew together less than 1700 acres, but this has steadily increased over the last 20 years to more than 7000 acres. The counties showing the greatest increase are Amuri and Waipara. They contain a fair proportion of medium to light land and tussock country and suffer from very dry spells with hot, north-westerly winds, and pastures dry out very rapidly.

The turnip crop was once very popular in this district and in some counties near the foothills it is still grown for winter feed. In Amuri and Waipara Counties, however, turnips cannot be relied on, so that an increasing number of farmers are turning to lucerne to ensure at least some fodder for stock during winter. If meadow hay is made in this district, a substantially greater area than is required for lucerne has to be closed early in the season, when very often all the feed available is required for ewes and lambs. There has also been an increase in the acreage saved for grass and clover seed, and lucerne has been found to be of great assistance in enabling all these things to be done and at the same time maintaining a reasonable supply of winter feed.

In North Canterbury increasing use is being made of a combination of lucerne and cocksfoot on some of the lighter soils that previously grew little if any feed during the summer months. Lucerne is also being used as a dual-purpose crop, providing grazing for the ewes in early spring, hay during the November period, and grazing for the lambs about February. Under this treatment the lucerne stands do not perhaps last as long, but they fill a very important gap for the farmers, and it is very probable that the practice will increase, with benefit to both the land and the farmer himself. With the great improvement in haymaking machinery the saving of hay is not the problem it was a few years ago, and this also will tend to bring about an increase in the area of lucerne.

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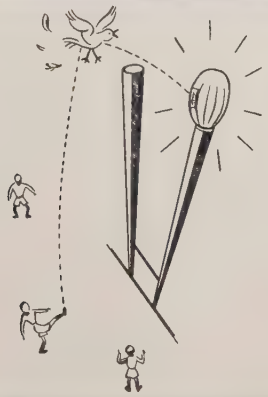

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Central Canterbury

The area comprising central Canterbury lies between the Rakaia River and the Waimakariri River and takes in 12 counties. Immediately before 1930 about 1300 acres were saved for lucerne hay in this area, but since then there has been a steady increase and 6000 acres were used in 1947. All counties show an increase in the acreage of lucerne grown, the greatest being in Ellesmere and Paparua Counties.

The district has a wide variety of soil types, but all counties are capable of growing reasonably good lucerne crops. The uncertainty of the turnip crop has in some measure accounted for the increased interest shown in lucerne.

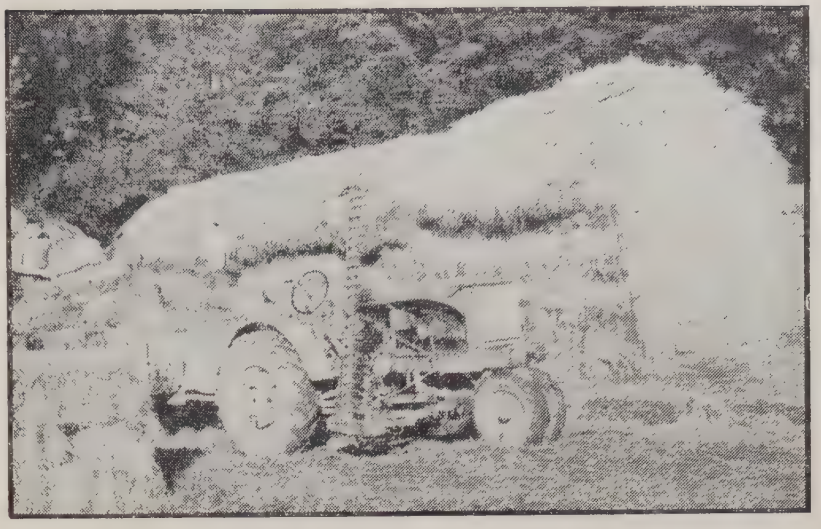
It has also been found that lucerne will grow in localities which in the past were considered quite unsuitable. Some of the light Burnham soils, for instance, are growing surprisingly good crops. Certainly in some seasons the growth during summer is small, but nevertheless lucerne holds on longer than pasture and can be depended on to give at least one good cut of hay and probably provide grazing for lambs in periods of feed shortage as well.

Large areas of land in this district could grow lucerne very well, and it is considered that with the increasing knowledge and experience being gained more farmers will turn to this crop as an insurance against feed shortages.

Ashburton County

Ashburton County has often been called the granary of New Zealand, as it is here that the greatest quantity of wheat is grown. Over the past 20 years the area of lucerne grown for hay has increased from 50 acres to almost 2000 acres. This increase, greater than that shown anywhere else in New Zealand, is largely due to the uncertainty of the turnip crop for the last 15 to 20 years. In recent years dry conditions have made it very difficult to grow a satisfactory turnip crop. The average annual rainfall for the county is from 20 to 25in., and with the very dry north-west winds during December, January, and February turnips have been a rather risky crop, so that farmers have looked for an alternative and are now growing blue lupins and lucerne instead.

Certain areas in this county are particularly suited to lucerne, for example, all the land on the south side of the Rakaia River from Rakaia to Barrhill provides some of the finest soil for its growth. The extension of irrigation to Ashburton County has also been responsible in some measure for the increase, and as the practice extends a still larger acreage will be grown.



Lucerne hay being loaded out of stack on a town milk supply farm.

South Canterbury

Levels and Geraldine Counties

Levels and Geraldine Counties comprise the major part of the downlands of South Canterbury. A large portion of these downlands was earlier considered unsuitable for lucerne growing, and just before 1930, 400 acres only were cut for hay in both counties. However, such has been the progress with this crop that in 1947 the acreage had increased to 1650, a rather remarkable increase when the type of country is considered. With perhaps the exception of a few areas in and around Geraldine and Temuka, the land is not what would be classified as good lucerne land, but with the application of adequate lime and superphosphate some very successful stands have been established. With the success that has been achieved over the past few years, it can be confidently predicted that the area in lucerne in these two counties will increase. The length of life for lucerne stands on the downlands is from 5 to 7 years.

Waimate County

In 1928 the area of lucerne grown for hay in Waimate County was 450 acres, but it increased steadily until 1944, when almost 2400 acres were harvested. From then until 1947 (the last year for which figures are available) the area declined by 1000 acres. This decline might be accounted for by a slackening in effort after the war. The rainfall in the county is approximately 23 to 25in., and the steady increase in acreage since 1928 indicates that generally the soils are suitable for lucerne growing. There are also indications that the present downward trend will be arrested and that increased areas will be cut for hay in the future.

Farmers are finding that lucerne can be grown on the clay downs and, though perhaps the crop is not quite so prolific as on better soils, stands are still good enough to give reasonable crops of hay for 5 to 6 years.

Mackenzie County

Mackenzie County takes in the Mackenzie Plains and the high country extending to the Southern Alps, bounded on the south by the Waitaki River, on the north by the Rangitata River, and extending eastward to the town of Cave. Though the area of lucerne in the county is not large, there has been an increase from a little more than 100 acres in about 1930 to almost 500 in 1944, since when a downward trend to less than 400 acres is recorded. Lucerne is grown on a number of the larger stations at an altitude of from 1800 to 2000ft., and under these conditions it does remarkably well. At Fairlie and Albury there are also areas suitable for lucerne, and farmers in these districts are gradually increasing their acreages.

North Otago

In the drier areas of North Otago lucerne has been a popular crop for a considerable period. During the past 20 years there has been a steady but not great increase in acreage, and when lucerne's drought resistance is considered it is hard to understand why even more areas have not been established. Large tracts of land are burnt out almost every summer, and much of this land could profitably be resown to lucerne stands.

LUCERNE ACREAGES CUT FOR HAY AND SILAGE

Average of 5-year period

District	1928–32	1933–37	1938–42	1943–47
Marlborough	2,800	2,625	2,995	2,905
Nelson	395	740	940	965
North Canterbury	1,635	2,400	4,060	6,575
Central Canterbury	1,470	2,245	2,930	4,955
Ashburton	145	325	555	1,460
Levels and Geraldine	420	500	735	1,630
Mackenzie	125	145	290	435
Waimate	520	795	1,455	1,805
North Otago	2,635	2,905	3,130	3,740
Central Otago	5,720	5,540	5,365	6,270
Otago South Otago, and Southland	770	680	560	625

Lucerne hay in rolled bales being fed to sheep.

Most of the lucerne hayed in this region is grown in Waitaki County, where the area in lucerne is greater than that in any other county in New Zealand. Waitaki for many years has had a large lucerne acreage, but in the past 20 years there has been little increase, from 2500 to 3100 acres. However, the crop has maintained steady progress. Its popularity in the district is in no small measure due to its ability to produce growth when drought kills out the pastures, and its use has been further stimulated in recent years by the introduction of mechanical harvesting.

The 250 acres of lucerne in Waihemo County are almost double the area grown there 20 years ago. Most of the stands are to be found on the alluvial river-silt country between Bushey and Dunback. Lucerne is still grown only on the better and sweeter land in this county, but with the use of lime it could well play a prominent part also on the sourer land further inland.

Central Otago

The acreage in lucerne in Central Otago has always been large. Lucerne means much to the farmers in this area, where the summers are hot and dry and the winters long and cold. Soils generally are extremely fertile, being mainly of mica-schist or river-silt origin. Lucerne is grown more particularly on the sweeter soils. Under a rainfall of 12 to 20in. per annum and at elevations of 800ft. and more the full value of lucerne is best seen in relation to the limited range of other fodder available. In Vincent County the acreage has fallen from 3800 (at that time the biggest acreage in any county) to something over 2000. This decline is a reflection of the development of irrigation in the county, and is not an indication that lucerne has lost its popularity. Before the use of irrigation farmers grew fairly large areas of lucerne to satisfy their hay requirements. Irrigation has meant increased hay yields, and with the use of improved pasture species has also increased the life and production of pastures. However, the extra water has caused lucerne stands to become weedy and unprofitable at an earlier stage. Farmers have accordingly found it more economic to reduce their lucerne acreage while still maintaining their total hay production, at the same time paying more attention to the improvement of their pastures.

Lake County grows about 300 acres of lucerne for hay, the area having remained fairly constant. Only a small portion is grown under irrigation, and there is room for considerable expansion of lucerne growing in this county, which always requires winter feedstuffs and can, periodically, in summer still use additional supplies.

In contrast to Vincent County, Maniototo County in the same period has increased its acreage from less than 2000 to more than 3000. Irrigation has not developed here as it has in Vincent County, and the increased area of lucerne is simply a reflection of lucerne's ability to produce under dry conditions.

Another factor that has influenced the growing of lucerne has been the introduction of practical grazing of the crop. Farmers have found that lambs and, later, ewes could be grazed on lucerne without any ill effects on the stand, and on some farms 200 or 300 acres of lucerne are kept solely for grazing. Other areas are both grazed and hayed, and these areas have doubtless helped to increase the acreage in this county regarded as "cut for hay". Modern machinery, particularly the pick-up baler, has also helped to increase the acreage. Many farmers grow lucerne and bale the hay solely to meet the demands for it from other districts, particularly Southland.

Otago, South Otago, and Southland

The large area comprising Otago, South Otago, and Southland makes practically no lucerne hay, the acreage having fallen slowly from 800 to 600 in the past 20 years. Almost all the land in lucerne is about equally divided between Taieri and Tuapeka Counties, much of that in Taieri County being located in the Strath Taieri district, where conditions more closely resemble those of Central Otago and where in summer and autumn lucerne stands only are not burnt up.

Most of the lucerne is grown on the river-silt soils. Weed competition is the deciding factor which restricts the acreage of lucerne on the Taieri Plain. Here stands soon become overrun with ryegrass, white clover, and weeds, and the reduced lucerne acreage of the county generally has been brought about by the smaller areas in this district.

In Tuapeka County the acreage has decreased during the past 20 years, and it is apparent that much of the land is of a type between that on which lucerne hay is an economic crop and that on which it disappears from the list of items of farm production.

In the remainder of the Otago, South Otago, and Southland area lucerne for hay is not regarded with favour. Though stands may be established with reasonable ease, from then on there is a constant battle between the lucerne and invading plants and weeds. Here, also, when the first two cuts are ready the weather is generally unsuitable or risky for haymaking. The making of silage might offset this drawback, but it is not a popular practice. A further disadvantage is that the cuts most suitable for hay are taken when farm work, with the sowing of winter-feed crops, shearing, and turnip thinning, is already at a peak.

Moreover, the practice of sowing seeds of improved pasture strains, combined with adequate topdressing with fertilisers and lime, has extended the period of herbage growth in the far south.

The amounts of lucerne hay railed into the district from further north indicate that farmers obviously recognise the value of this fodder, but their disinclination to save their own requirements is a fair indication that in this district the practice is not an attractive one.

Conclusion

The comments on the trends of lucerne hay production in the different areas reveal that in the drier areas there is still room for considerable extension of this practice.

In most districts where a static position or downward trend is evidenced some alternative source of fodder is available to take the place of lucerne hay. Here also the factors of weakening stands, weed ingression, and weather conditions for haymaking do not encourage the farmer to persevere with lucerne haymaking. In those few districts where there is no adequate alternative to lucerne hay, the difficulties of production are such as to cause farmers to purchase their requirements rather than to attempt home production.

Lucerne is a valuable hay crop; whether larger or smaller acreages will be grown will depend upon the ease with which stands can be maintained, the availability of alternative fodder, and the suitability of the climate for haymaking.

Flower Garden Plants to Provide Blooms for Household Decoration

WHAT can be grown in the home garden for cut flowers for house decoration is a question which is often asked and easily answered. Many thousands of species of cultivated plants are useful for indoor decoration, but the problem is never entirely solved for the home gardener until he sets aside a section of his garden for the sole purpose of growing flowers for house decoration. In this month's article for the flower gardener C. K. Ellis, Horticulturist, Department of Agriculture, Dunedin, lists the types of annuals, perennials, shrubs, and foliage plants most useful for the home gardener's cut flower section.

MOST border plants produce worthwhile displays of flowers, but many also have handsome ornamental foliage. Probably the most valuable of these are the types with broad or tapering leaves, such as the irises. The serrated fronds of some native ferns may also be included. This type of foliage is extremely useful in many flower arrangements, particularly in mixed bowls. The foliage of thalictrum and aquilegia is as useful for daintier arrangements as is that of maidenhair fern.

Grey-leaved plants, of which *Centaurea ragusina* and *Pyrethrum ptarmeciflorum* are probably the best, may also be included in the border.

Because of their great variety of foliage forms and colours shrubs are invaluable. Silver and bronze foliages are the most plentiful, but many other useful colours can be found. Of the silver-leaved shrubs *Senecio greyi* and the lavenders are the best known and easiest to cultivate.

Berberis thunbergi atropurpurea, Rhus cotinus foliis purpureis, and *Prunus pissardi* are good for their bronze foliage, and golden privet, golden holly, and *Acer negundo variegatum* are the best of the golden-foliaged plants.

Many of the evergreens are useful to a greater or less degree. *Arbutus unedo*, viburnums, and some of the evergreen types of berberis are easily grown. Many of the conifers are good, but because of their slow growth they should not be picked or cut too often.

[*Photo News Ltd. photo.*

Coreopsis, one of the most useful types of annuals for the purpose, supplies splendid cut flowers which last well in water.

The rose, often called queen of the garden, also supplies blooms which are among the best of cut flowers.

Coloured Bark and Twigs

Brighter colours in bark are produced by only a few species, but much decorative value can be found among the twigs during winter. The birch is the best known of the species producing colourful bark, notably the Swedish birch, *Betula verrucosa* var. *dalecarlica*, with its beautiful white branches and drooping branchlets. The bark and twigs of the Japanese birch, *Betula maximowiczi*, are of a glowing orange.

Long, slender, golden yellow stems of weeping form are produced in winter by *Salix vitellina* var. *pendula* and upright purple stems by *Salix magnifica*.

For more brilliant colours little can be better than dogwoods (*Cornus* spp.). *Cornus alba* has stems turning brilliant red in autumn, its variety *sibirica* becomes crimson, and the variety *stolonifera flavaramea* displays bright yellow.

Herbaceous Perennials

Among the herbaceous perennials is a great wealth of material suitable for cut flower work. It is probably more important to have a separate section of the garden for cut perennials than for any other types of flowers used for cutting, because normally flowers with fairly long stems are needed for indoor decoration, and the cutting of border perennials in such a way tends to leave them looking rather untidy.

Of the hardy perennials suitable for the cut flower section the following are probably the best and are certainly some of the most easily cultivated:—

Achillea
Aquilegia
Alstromeria
Artemisia
Aster amellus group
Border carnations
Centaurea
Chrysanthemums
Delphiniums
Dianthus
Doronicum
Eryngium
Gaillardia
Gypsophila
Helleborus
Humea
Iris
Lupinus
Monarda
Polyanthus
Primula species
Pyrethrum
Scabiosa
Statice
Thalictrum

Larger Herbaceous Plants

A few of the herbaceous plants suitable for larger types of floral decoration are:—

Aster novae-angliae
Aster novi-belgi
Delphiniums
Eremurus
Gypsophila
Iris
Kniphofia
Paeonia
Phlox
Papaver
Rudbeckia
Solidago

All these plants require some staking, hoeing to keep the soil loose, and feeding. By October in most districts it will be necessary to begin staking to keep the stems straight. If the soil is in good condition initially, little fertiliser need be applied for the first two seasons, but after that moderate quantities will be necessary—say, 3oz. per square yard of a balanced garden fertiliser containing the elements nitrogen, potash, and phosphorus.

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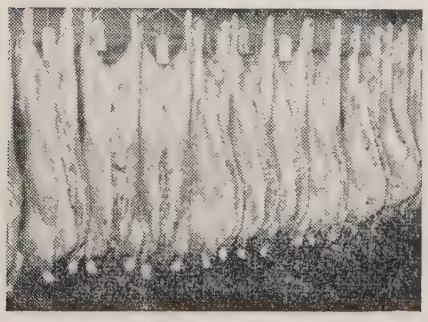

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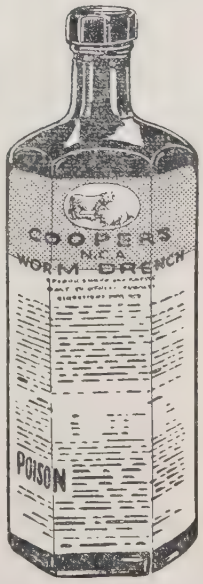

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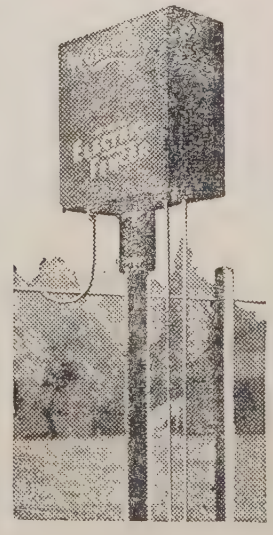

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BRANCHES THROUGHOUT NEW ZEALAND

For the home gardener all these types of plants are probably most easily propagated by division. During autumn or spring the plants may be lifted and divided into several pieces, usually the centre of each plant being discarded because the outside is younger and more vigorous. The small pieces which are obtained by pulling the plant apart are replanted in the soil at the same depth at which they have been growing.

Bulbs

Most hardy bulbs give excellent cut flowers which last well in water. They have a character of form which allows them to be used with little else.

For the successful growing of bulbs for cut flowers a well-drained soil is essential. The drainage of a wet soil can often be improved by adding sharp sand, and occasionally bulbs are assisted by a layer of sharp sand immediately beneath them when they are planted. Phosphatic fertilisers and those containing potash are the most important for bulbs. Phosphate can be supplied in the form of bonedust or bone meal at planting time, and the potash can be supplied during the growing season as sulphate of potash.

Lifting all bulbs every season is not necessary, but some definitely do better if lifted annually. Tulips and gladioli should be lifted annually when the foliage has died down completely. When they have dried out they should be cleaned and have their old skins and withered roots brushed off. Just before planting time all offsets should be removed and sown in a separate bed if they are required to increase stocks.

The most easily grown of the bulbs suitable for supplying cut flowers are:—

Anemones
Chionodoxa
Gladiolus
Iris
Leucojum
Muscari (grape hyacinths)
Narcissus
Ranunculus
Tulips

[*Douglas Elliott photo.*

The flowering cherry (*Prunus cerasus*). Their great variety of foliage forms and colours makes shrubs invaluable for providing material for indoor decoration.

Roses

The rose must be considered one of the finest of cut flowers, and few New Zealand gardens do not have a few roses of some kind. The ramblers, climbers, polyanthas, hybrid teas, and perpetuals are all excellent subjects to provide flowers for indoor decoration. They can be grown best in soil which can be made firm and contains generous quantities of humus in the form of compost, leaf mould, green manure, or farmyard manure.

Roses are best planted in most parts of New Zealand about late July or August. Any damaged roots should be cut off cleanly before the plants are placed in the soil, and all the types mentioned may be pruned fairly severely after being planted.

The marigold is an easily cultivated annual of exceptional value for cut flowers.

Shrubs

The demand for flowers at almost any time of year can be met largely by a wide variety of flowering shrubs which can be grown easily in almost any garden. For larger flower arrangements a few pieces of woody growth with a mass of green foliage and brightly coloured flowers are invaluable, as are the sprays of flowers borne on stems which have not yet produced their leaves. The shrubs must be divided into two types—those which can tolerate the cutting from them of large branches, and those which will tolerate only the removal of a few flowers.

Of the first group there are many, including:—

Berberis
Cotoneaster
Cytisus
Chimonanthus fragrans (wintersweet)
Forsythia
Hamamelis mollis (witch hazel)
Hydrangea
Jasminum
Philadelphus (mock orange)
Ribes
Syringa (lilacs)
Viburnums

The second group includes:—

Azaleas
Chaenomeles (japonica)
Daphne
Erica
Garrya
Laburnum
Prunus
Rhododendron

Annuals

Among the annuals are many plants of easy cultivation and exceptional value for cut flowers. The soil for a bed of annuals should be in good mechanical condition, well drained, and well supplied with organic plant-food material. Manure should be applied yearly, because most annuals are quick-growing, fairly soft plants which require considerable food during their short growing season.

Some of the most useful types are:—

Annual carnations
Annual chrysanthemums
Candytuft
Clarkia elegans
Coreopsis
Godetia
Gypsophila elegans
Helianthus (sunflower)
Larkspurs
Linaria
Marigold (*Calendula officinalis*)
Mignonette
Poppies (Iceland and Shirley)
Scabious (annual)
Sweet peas
Sweet williams

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Begonia and gloxinia tubers should now be started gently into growth by being half buried in boxes of potting compost, sprinkled with water, and stood in a warm, sunny place, preferably in a glasshouse heated at night to prevent the temperature from falling too low. Each tuber must be sound and healthy, any soft or rotten places being cut out with a sharp knife.

Chrysanthemum propagation can be started now. Roots which have been left in the border from last year should be divided and replanted in August or September, as newly planted chrysanthemums produce finer flowers than old clumps. Last year's stools which have been put in pots or frames to produce cuttings should be watered when necessary.

Cuttings can now be taken of lobelia, geraniums, heliotrope, and balsams growing in a glasshouse. The cuttings will root easily and provide useful young stock to plant out later in the year when danger of frost is past.

Dahlia propagation should be started by putting the roots to be increased into boxes in frames or on the bench of a glasshouse and packing damp soil round them. The soil must not cover the tops of the tubers. In damp, warm conditions new shoots will start to grow rapidly.

Fertilisers should be used regularly on flower borders in all but the most fertile soils for best results. The most satisfactory system is to dress the whole of the borders each year in August with 2oz. per square yard of complete flower border fertiliser (3 parts of blood and bone, 2 parts of superphosphate, and 1 part of muriate of potash).

Unrooted and rooted cuttings of geranium (zonal pelargonium) and sweet william.

The dressing often produces astonishing results. The borders should be measured up now, the ingredients obtained and mixed, and the fertiliser applied evenly over the surface.

Frames are useful for a variety of purposes in the garden and increase the range of plants that can be propagated and grown at home. Even if a proper frame is not available, every garden should have at least a substantial wooden box, from which top and bottom have been removed, partly sunk in the soil to make it more stable and keep out cold draughts, and covered at the top with a sheet of glass. A frame enables plants to be kept moister, warmer, or drier than those in the open ground, according to their requirements at different times of the year.

Hydrangea plants in pots should be started into growth as described on this page.

Fuchsias in pots which have been rested through the winter should be brought out, put in a warm, sunny window, and watered. When the buds start to grow the plants should be turned out of their pots, the roots shaken free of soil, and the plants repotted into potting compost. Finally prune back each plant to within an inch or two of its base to encourage the growth of strong new shoots.

Gladioli do best in a sunny, warm site, sheltered from very strong winds, and in deep, well-drained soils, but give poor results in shallow soils or hollows where water collects after rain. It is worth while going to some trouble to dig the ground deeply and provide gladioli with a place in the garden where their needs will be most nearly satisfied. Corms in store should be inspected at intervals and any which show bad scars, rotten patches, or scabs should be burnt. Slight infections should be cut out with a sharp knife, but there is little chance of seeing them until the corms have the outer skins pulled off just before being planted. Planting can continue in very early districts, but the main planting is not usually made until September or October.

Herbaceous plants should be planted out as soon as possible. Perennial phlox, heleniums, scabious, pyrethrums, and perennial asters are all free flowering and very suitable for the small garden. *Scabiosa caucasica* is one of the best perennials for cutting, providing a long succession of blooms each year. Plants are increased by being lifted, divided, and replanted in autumn or early spring.

Hydrangeas in pots should now be started into growth by being put in a warm, sunny place and watered. When growth starts, the surface soil should be scraped off and replaced with a layer of new compost with which has been mixed a teaspoon of complete fertiliser for each pot.

Lawns sown last autumn should be mown only with the blades set well above the surface. The level of cut can be lowered gradually later as lawns become better established.

Plant pots are dry when bought and it is essential to soak new pots thoroughly in water and then allow them to dry superficially before they are used. Pots which have been used before should be sterilised by being brought to the boil in water and cleaned by being scraped with an old knife and brushed vigorously to remove all traces of green encrustation and old soil. A plant potted up into a dirty pot cannot be turned out again without damage to the fine roots, many of which will stick to the lumps of dirt on the pot and be pulled off as the plant is turned out.

Root cuttings can be used to increase stocks of peonies, oriental poppies, gaillardias, and anchusas. For this interesting method of propagation dig up established plants in autumn or late winter and cut pieces of root 2 to 3in. long and as thick as a pencil or thicker. Root cuttings should always be cut off square at the top and slanting at the bottom so that one end can be told from the other at a glance. Put the cuttings upright a few inches apart in boxes of good compost or in a sandy, open soil in a frame, setting them so that the top of each cutting is just below the surface. The cuts soon heal, roots grow from the bottom, and one or more shoots appear at the top. The cuttings are then ready to be planted out, all the shoots but one being removed if several have grown.

Sow flower seeds under glass in boxes to produce bedding plants for setting out in October. Salvia bonfire, *Phlox drummondi*, petunias, *Begonia semperflorens*, lobelias, stocks, antirrhinums, hybrid dianthus species, *Primula sinensis*, verbenas, nemesias, African and French marigolds, and zinnias are suitable. For gardeners fortunate enough to have a greenhouse with some form of heating, the best temperature for raising seedlings of all these plants is between 60 and 70 degrees F. Most of the plants listed can be grown in a cold frame without heat, but in those circumstances sowing is best delayed for a few weeks.

Sterilise loam, boxes, pots, and other equipment in preparation for their use for seed sowing, pricking out, and potting. Early spring is a busy time for gardeners, especially those with glasshouses who raise their own bedding plants, but these items are best not sterilised until just before they will be needed, so that the risk of their being contaminated again after sterilisation is reduced. Small quantities of soil in "potting condition" can be sterilised perfectly well in an oven, spread in meat tins in even layers not more than 3in. thick. The temperature should be tested from time to time with a dairy thermometer, and the soil can be considered sterilised when its temperature reaches 180 degrees F. in the centre of the layer.

Sweet peas can continue to be planted out 6 to 15in. apart, the closer spacing where the row is being grown for a bold display of colour and the wider spacing if the peas are to be trained as cordons. Arrangements must also be made for supporting the row, stout posts being placed every 10 to 12ft. and wire netting, sheep netting, manuka brush, or other supports fastened to wires strung near the ground and along the tops of the main supports. Whichever system is used, it must be strong enough to withstand the worst gale likely to occur during summer, when a well-grown row of sweet peas presents a large area to the wind.

Damping-off Disease

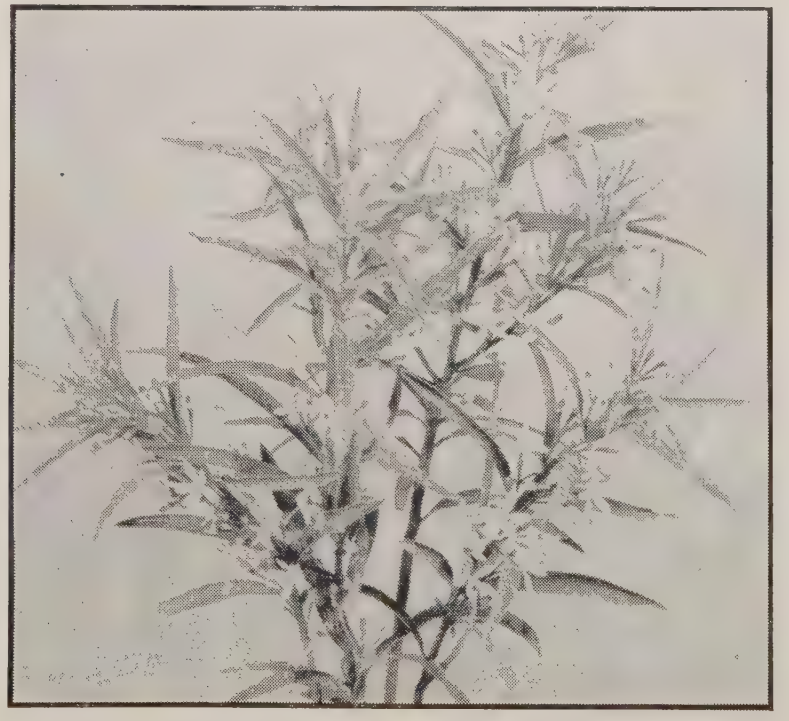
The most troublesome disease of small seedlings, damping off is caused by a fungus (*Pythium de baryanum*) which attacks young plants, invading their stems just above soil level and causing them to topple over and die. The disease spreads rapidly from plant to plant, so that the seedling first attacked is soon surrounded by a growing patch of dead seedlings. The fungus is spread by fine threads (hyphae) which can just be seen with the naked eye, ramifying in all directions from affected plants.

Good cultural conditions can do much to prevent trouble from damping off. The disease is most common and troublesome where seedlings or young plants are overcrowded, resulting in soft, sappy growth and weak stems which are specially susceptible to attack. Thin sowing of seeds and early pricking out of seedlings do much to prevent damping off. The use of sterilised compost is the other major factor in prevention, as infection usually comes from the soil, but damping off sometimes occurs even in sterilised soils.

At the first sign of damage the affected groups of seedlings and those for an inch or two around should be carefully lifted out of the box and burnt. The remainder should then be watered with Cheshunt compound, which can be bought ready for use or made by mixing 2 parts by weight of pulverised copper sulphate with 11 parts of ammonium carbonate. Allow the mixture to stand for 24 hours in a tightly corked bottle, then use 1oz. dissolved in a little hot water and made up to 2 gallons with cold water. Apply it as quickly as possible at the rate of a quart to each square foot of surface.

As a further precaution against damping off, especially if unsterilised soil is being used or the seedlings are particularly valuable or vulnerable to attack, the box of compost should be watered thoroughly with Cheshunt compound before the seed is sown and again sprinkled lightly with it after the seed has been covered with soil. A moist, warm atmosphere is most conducive to an attack of damping-off disease, and these conditions should be avoided for the raising of seedlings, which in any case will make the strongest plants if grown in fairly cool conditions.

Eriostemon myoporoides



A VALUABLE evergreen shrub from Australia, *Eriostemon myoporoides* (syn. *E. neriifolius*) grows from 3 to 4ft. high and often as much in diameter. This compact-growing shrub with scented foliage produces an abundance of clusters of white, scented, star-shaped flowers in early spring. The plant may be pruned back and excess growth thinned after blossoming has finished.

Plants may be propagated by cuttings 2in. long taken from side growths with or without small heels of old wood attached. These are inserted in a sandy compost in a glass-covered frame, box, or pot in January or February.

—*H. P. THOMAS, Vegetable Instructor, Department of Agriculture, Wanganui*

A GOOD CHINESE DINNER is such a memorable experience that it stimulates the desire not only for more such meals but for some knowledge of the skill required to produce a few of the characteristic dishes. It becomes an adventure into some understanding of the knowledge, skills, and even wisdom of another people as they are expressed in their way of meeting the fundamental need for food that is common to every human being. In Australia the interest is such that department stores hold special cookery demonstrations in Chinese food. In America and Europe it has long been possible to dine after the national manner of almost every country in the world in restaurants specialising in one country's cookery. This is the first section of an article by Dorothy Johnson, Rural Sociologist, Department of Agriculture, Christchurch, designed to lure the New Zealand housewife into venturing into the realms of Chinese cookery. The concluding section, which will deal more specifically with recipes, will be published next month.

CHINA has a long history of cookery, which has always ranked there as one of the worthwhile arts among even that nation of artists. From Chinese men of letters books of recipes as well as books of poems have come down the ages. Their work and experimentation seem to have brought them to a belief in the saying that "Man is what he eats". Certainly, without the benefit of modern science they have evolved methods of cookery, especially of vegetables and meat, that conserve to the full their food value, including their vitamin and mineral content. In the conservation of food values, especially of vegetables, the results of their art and the findings of modern nutritional science in the West are substantially the same. As a proper choice of food was and is considered one of the arts of living, the Chinese approach to food is both aesthetic and sensuous. Attractive colour, artistic appearance, and stimulating smells denoting delicious taste are the essential requirements of good Chinese food. If these are satisfied, it is inferred that the food will nourish the body well.

In general, and with some notable exceptions, Chinese methods of cooking are basically the same as those in New Zealand: The utensils and ingredients are similar, but methods of preparation are widely different from those of English peoples. The subtle blending and wide variety of flavours and food combinations perhaps more resemble those of the French.

Chinese cooking can be classified into five main groups—stewing, braising, semi-frying, deep-oil frying, and roasting. Steaming is also used, but boiling seldom. Roasting is reserved mainly for special occasions and for festive dishes.

The greatest difference from European methods is in the cooking of vegetables, and possibly of meat, as is seen in this description of English cooking of vegetables by a modern Chinese writer: "Too often the vegetables are boiled until they are tender. The valuable mineral salts as well as the flavour are thus lost in the water, which is then poured down the drain. The result is a tasteless, pulpy substance with very little goodness left in it."

He quotes Lin Yutang as saying: "The English have lost or have never known the art of cooking vegetables."

Meat and Vegetables

Chinese housewives use the method of semi-frying for meat and vegetables. The cut-up foods are fried in a small quantity of lard or oil at a high temperature and are stirred quickly for a short time. They are then simmered for a few moments with a lid on the pan. Some, such as spinach, marrow, or lettuce, do not require the addition of water, but the harder vegetables, such as cabbage, cauliflower, green beans, turnips, and carrots, need a small amount of water after the initial frying in fat.

Though, on the average, the Chinese fare mainly on vegetables, eggs, and bean products, and very occasionally have fresh fruit, they are able to maintain good health because they know how to make vegetables as palatable as meat and to use their value to the fullest extent. Western nutritional knowledge substantiates that claim. Quick cooking at a high temperature conserves vitamin values, but long, slow cooking in large quantities of water destroys them. The use of only a minimum of liquid, none of which is discarded in the finished product, conserves the mineral values too. Not only the food value but the palatability and attractiveness of vegetables are preserved by the Chinese method. Frying them in small quantities of lard or oil brightens the colour, especially of green vegetables, preserves a crispness with the tenderness, and produces new flavours which make a palatable gravy.

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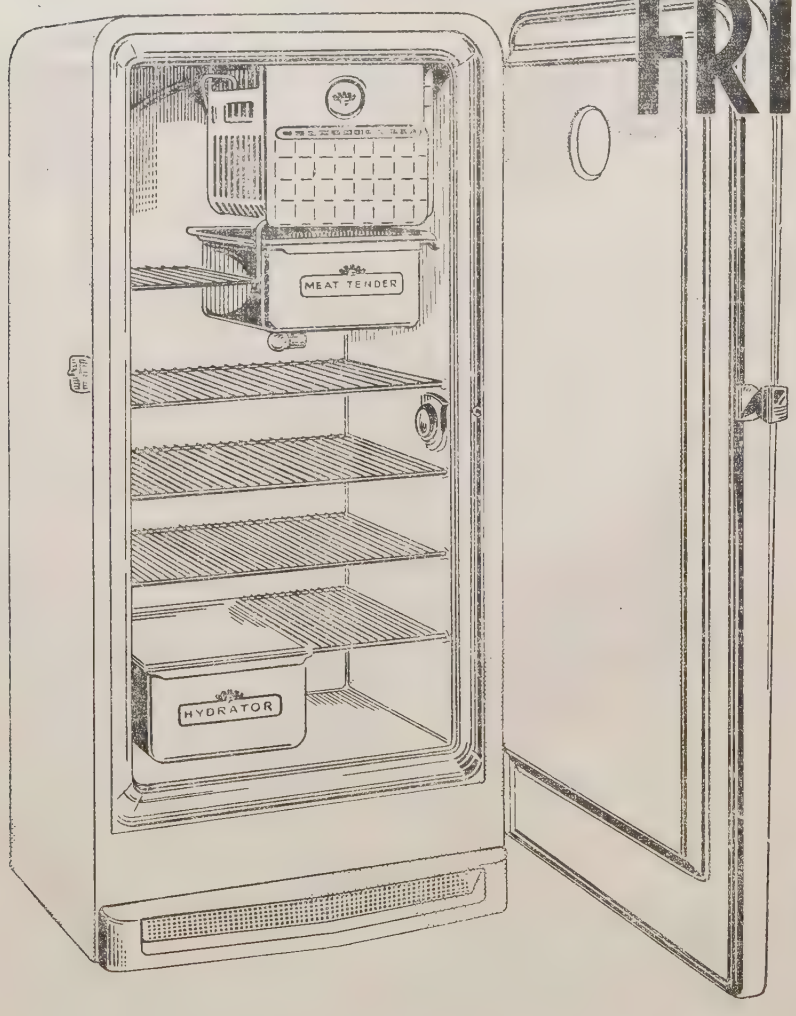

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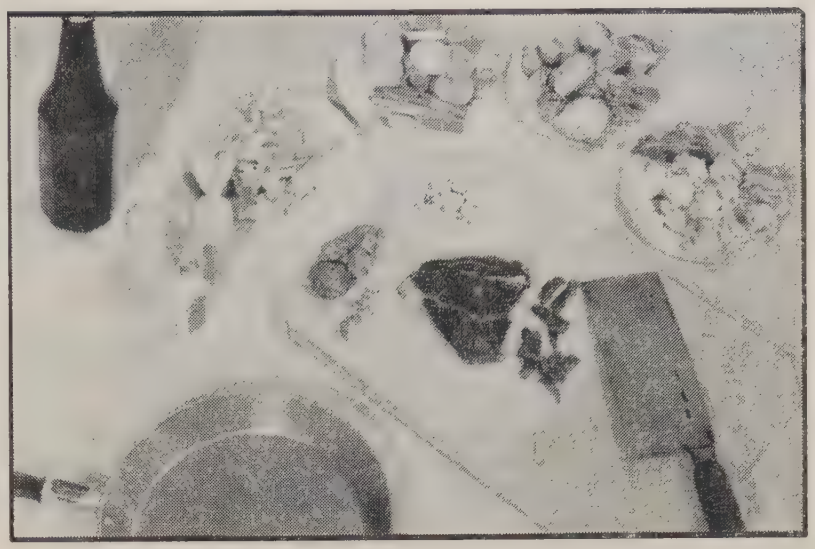
It is claimed that quick semi-frying of cubes or thin strips of meat with the addition of, for example, a little root ginger produces new flavours and sterilises the meat before the protein and connective tissues have time to shrink and toughen. The Chinese claim that the Western methods of long, slow cooking of large pieces of meat are necessary to undo the toughening process at the beginning. In other words, if meat is cut up and cooked rapidly for only a few minutes, it is still juicy and tender; if the cooking is prolonged for another 10 minutes, as is required for larger pieces, a further long period of cooking is necessary to soften the toughened fibres.

The fact that these methods were being followed many hundreds of years before the findings of the modern science of nutrition were issued betokens some considerable culinary or dietetic genius in the Chinese people.

The Chinese do not use quick methods of cooking for cereals. Rice, which is the staple food in south China, and steamed wheaten bread or mantou, which takes its place in the north, are cooked for about the same time as they are in New Zealand. These foods can be and often are prepared beforehand, though ideally they should be cooked so that they are just ready at the same time as the meat and vegetables. Noodles, which are made from either wheat or rice, take much time to prepare, though this is often done commercially as macaroni is for European peoples. Either type of noodles can be bought ready for the final cooking, which does not take long.

Kitchen Utensils

Chinese kitchen utensils are very much like those of the Western world with the exception, of course, of the wide variety of modern electrical equipment, though this probably is used in some well-to-do Chinese homes in the cities. The most commonly used pan is a deep heavy saucer-shaped iron pan. Cutting is done with a heavy iron chopper, which plays an important part in food preparation. For stirring food while it is cooking a flat iron utensil is used; it has a long wooden handle and is something like a child's spade in shape. Modern Chinese, especially in other countries, use heavy-gauge aluminium pans. A Chinese steamer has a network of bamboo instead of perforations in metal to let the steam through.

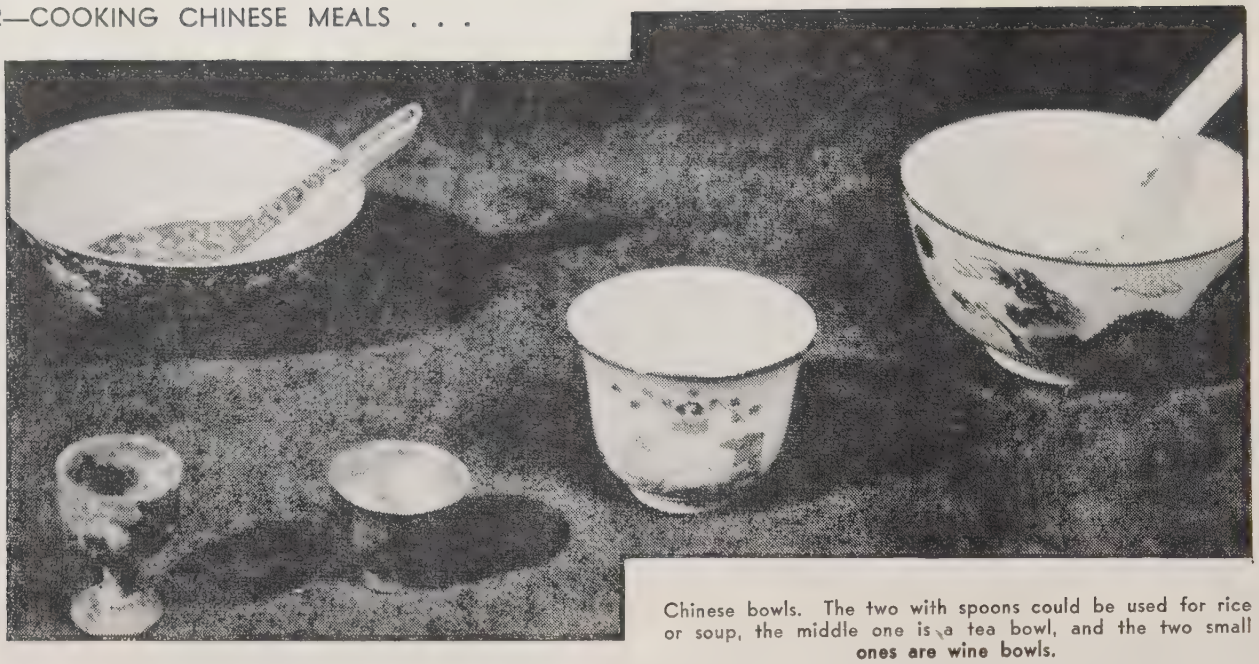


Ingredients for Chinese cooking (a small bottle of ve tsin, a large bottle of soy sauce, and root ginger and chestnuts) being prepared on the board with the meat and Chinese chopping knife.

Ingredients, Everyday and Unusual

Western people tend to associate Chinese cooking with exotic dishes of extraordinary ingredients—sharks' fins, birds' nests, bamboo shoots, water chestnuts, cloud ears fungus, and eggs several years old. In fact, a Chinese housewife has a shopping list not very different from a New Zealand one for the main ingredients. It includes pork, fish, eggs, poultry, beef, lard, vegetable oils, rice, rice flour, noodles, beans, marrow, peas, cabbage, onions, turnips, mushrooms, melons, peaches, and oranges. In the north two very common ingredients are bean curd and chillies, but bean curd would be very hard to obtain in New Zealand, and few Western people like the red or green chillies, which are very hot in the peppery sense. The poorer Chinese have little but bean curd, a little salt fish, marrow, and turnip with their rice, with hot peppers to give it flavour. Milk, butter, and cheese are lacking in Chinese dishes, as they have been produced only recently in that country and then mostly around the foreign settlements. They are not included in the traditional diet.

Tossing vegetables in hot fat, the first stage in the Chinese method of cooking them. The utensil being used is a Chinese stirrer.



Chinese bowls. The two with spoons could be used for rice or soup, the middle one is a tea bowl, and the two small ones are wine bowls.

However, one or two ingredients unusual in the Western diet are commonly used in the ordinary daily fare. The first is soya bean sauce or soy sauce, a savoury liquid extract of soya beans used to season and make gravy for many meat and vegetable dishes in which the food is braised or semi-fried. It has a strong flavour of its own and needs to be used with discretion, as it destroys the original flavour of the food if used too liberally. Meat or vegetable extracts make very good substitutes mixed with water in the proportion of three parts of water to one of the extract; the mixing can be done in a spoon, as most recipes call for between a teaspoon and a tablespoon of soya bean sauce.

The aromatic seasoning ve tsin ("quintessence of taste") is a white powder containing monosodium glutamate, which in recent years has been extracted from proteins and used in Western cookery to add a meaty flavour to mixed cereal and meat dishes. It is expensive, but it is used only in minute quantities and not in every dish. Many Chinese omit it, as they consider its flavour can be used to disguise careless cooking.

Green root ginger, which is easily procurable in New Zealand, is almost a necessity. Dried mushrooms, garlic, aniseed powder, and dried tangerine or orange peel often figure in Chinese recipes and are all obtainable. Lard can be used instead of peanut or soya bean oil. Cauliflower sprigs or celery can replace bamboo shoots and water chestnuts. Cooking sherry is often used for fish and sea food.

Various combinations of these ingredients develop the stimulating smells and attractive flavours as well as adding to the food value of Chinese dishes. This is one of the spheres in which Chinese cooks have something of value to New Zealand housewives who wish to serve a wider variety of interesting dishes to their families. Those who have done so are certainly asked for more.

Methods of Preparation

Considerable differences exist between Chinese and English methods of preparing food for cooking. Chinese food goes to the table ready to be conveyed to the mouth. The cook does all the cutting, and chopsticks and a porcelain bowl and spoon are the only implements the diner requires. Tea and wine are drunk from bowls of smaller sizes. In Chinese eyes Europeans and Americans are a stage less civilised than themselves in that they still cannot dispense with knives on their tables: knives to the Chinese belong only in the kitchen. The writer entertained an American friend on his way back from China, where most of his adult life had been spent. He remarked slyly at dinner that after 40 years of civilised eating it was difficult to come back to more primitive manners where the diner was expected to cut up his own food because the cook (his hostess!) had not done her job properly.

Cutting is important because it determines the appearance of the dish and the time for which the food should be cooked. For braising and stewing, fairly large squares and strips 2in. wide are used; for semi-frying, the food is cut into fine, thin strips and dices. Most Chinese dishes are mixtures of meat and vegetables, so the nature of the vegetable determines the way in which the meat is cut. With peas and broad beans it would be diced; strips would be suitable with bamboo shoots or cauliflower, and slices with mushrooms. Variety and harmony are sought. The preparation and cutting of the food take much longer than the cooking. For the illustrations with these articles the vegetables were cut larger than they should be to assist recognition of the ingredients in the dish. The thoroughness with which vegetables and rice are washed in a succession of waters has to be seen to be appreciated.

Another very important factor is the seasoning. This also is done by the cook, not by the diner at the table. The aim is to develop the original flavour of the food. Heat causes a kind of chemical reaction on the condiment, and the developing flavour penetrates to every particle of food in the pan. The blending of flavours is part of the art of the cook.

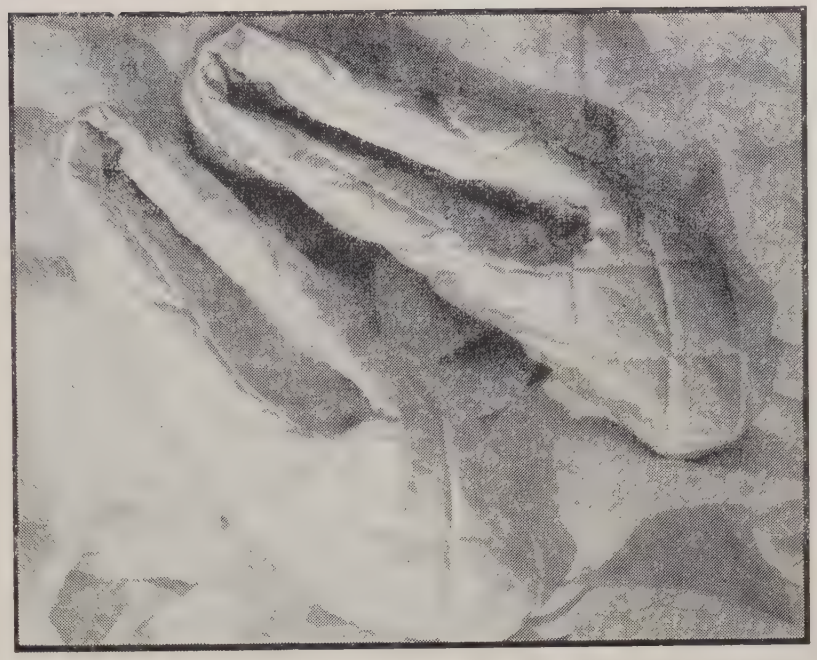
Ingredients can be blended in many different ways, and left-overs can be turned into delicacies. Many housewives are confronted with the challenge to produce an appetising meal in an emergency from what appear to be meagre resources in the pantry and garden. From some cold meat and perhaps a tomato or leek, or a few overgrown radishes and some peas, delicious dishes can be prepared by Chinese methods in a very short time.

Finally, the cooking and serving must be timed with great care. Chinese food must be served and eaten as soon as it leaves the kitchen. In restaurants the cooking is delayed until the guests are at the table. The full flavour and tenderness are lost if the food is lukewarm, and an unappetising greasiness may develop. If good Chinese cooking can scarcely be bettered for attractiveness, carelessness either in the quantities of fat and seasoning used or in the serving speedily makes it unattractive. There are good cooks and bad cooks in China as elsewhere.

A number of different dishes are served for a family meal. Each is sufficient in quantity for a meal for one person. Rice or mantou (a steamed loaf) is served to each person, who then helps himself from the main dishes as fancy dictates. This provides variety by quite a different method from that which is customary in Western countries. One dish may have chicken, fish, or pork as a main ingredient and others may consist mainly of vegetables. Any combination of the recipes to appear in next month's article may be used. The wide range of both climate and standard of living in China affects the meals. To describe a typical Chinese meal is much harder than to describe a typical New Zealand one.

. . . and Slippers to Match

SCRAPS of material left over when a dressing gown is cut out can be put to good use by making slippers to match. With a good pattern and the right material, a durable, comfortable pair of slippers is not difficult to make. Instructions for drafting a suitable pattern from individual measurements and directions for sewing slippers are given in this article by Helen Paine, Rural Sociologist, Department of Agriculture, Wellington, and they can be used equally well in the making of slippers as presents for male members of the family.



THE general proportions, the materials from which they are made, and the strength of the stitching determine the quality of a pair of slippers, but on two other factors depends success in making them: First, accurate measurement of the sole, which determines the shape of the slipper, and, second, ensuring that the two slippers of a pair match. It is wise to work on each slipper alternately at every stage of making them.

Choice of Materials

The range of materials from which to choose to make slippers is large. Plaited string and cord, thick felt, and carpet materials can all be used for soles; leather, too, is very satisfactory and wears well, but working it requires special equipment. Uppers can be made from almost any fabric, though stiffening and reinforcement are often necessary for the more delicate satins and velvets.

When buying slippers it is wise to select a strong pair with a good lining and, preferably, a leather sole. Such a purchase will give lasting wear and good value for the money. The luxury slippers available at high prices are seldom economical, because they wear out quickly. Pretty satins, soft chenilles, velvets, and brocades all look attractive when they are new, but their freshness wears off very soon.

On the other hand, only a few hours' work at home is needed to make slippers to match any pretty housecoat or dressing gown at the cost of a few shillings. Almost any fabric can be used, and even whole pieces of material are not essential, for small scraps can make an attractive patchwork upper, and plaited rag makes a strong, durable sole.

Equipment

As with every other craft, good tools are necessary for slipper making. These tools vary with the type of material used, but the following list of equipment includes all that are likely to be needed:—

Strong sewing needles, sharp scissors, and a knife with a pointed blade.

An awl if any work is to be done on thick leather.

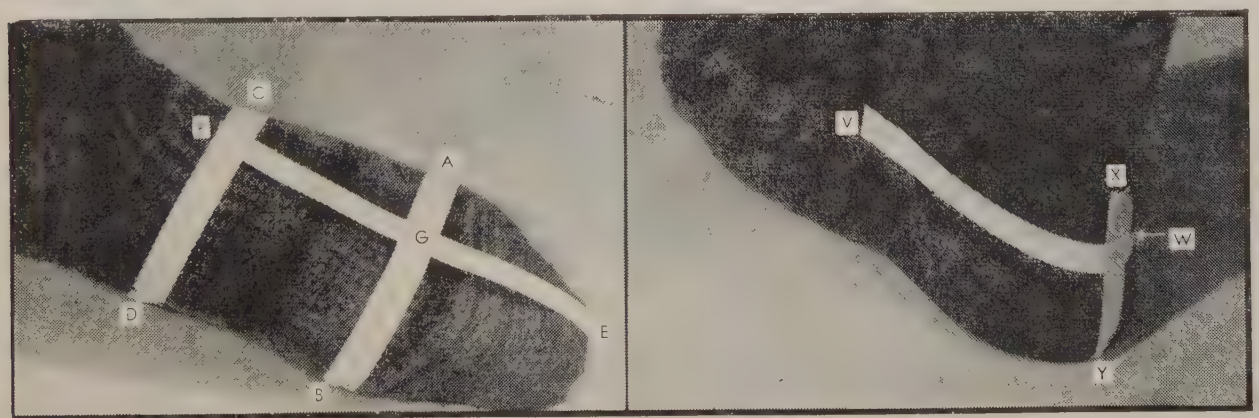
Good strong thread—book-binder's thread, cobbler's thread, carpet thread, or any well-waxed linen thread, all of which are available.

Good-quality glue if materials have to be joined together without stitching; gum or paste is never satisfactory.

A stiffening material for the heels of most slippers.

The Pattern

A pattern can sometimes be bought, but drafting one is more interesting and not very difficult, and it offers the added advantage that the slippers can be made to individual measurements and in a preferred style. The slipper pattern consists of the sole and the upper, which may be either in one piece or two—toe and heel. The illustrations below show where the essential measurements are taken.



The positions for measuring the toe and heel pieces. AB is the widest part of the foot. CD is the measurement across the highest part of the instep. EF is the measurement from the centre of the toes on the floor to the highest part of the instep. GF is the distance between AB and CD. XY is the height of the heel from the floor, which must be sufficient for a comfortable fit. VW is the measurement around the heel and as far forward as required.

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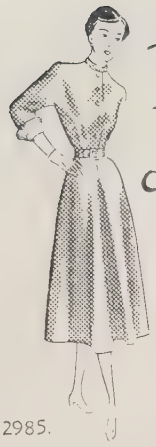

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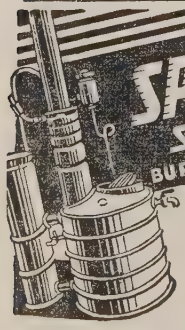

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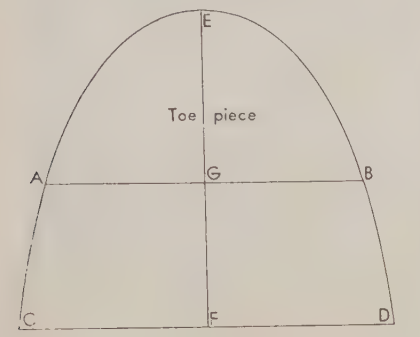
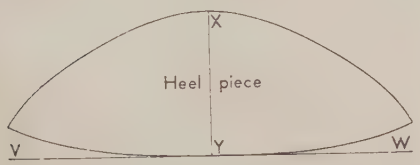
Two-piece Upper

Toe: Draw the line CD and mark the point F halfway across it. Draw the line FE at right angles to CD. Mark the point G on the line EF, and draw the line AB parallel to CD with G as its mid-point. Join the points C, A, E, B, and D, then round off the lines between A and E and between E and B. This basic design for the front part of the upper and variations of it are shown in the diagrams.



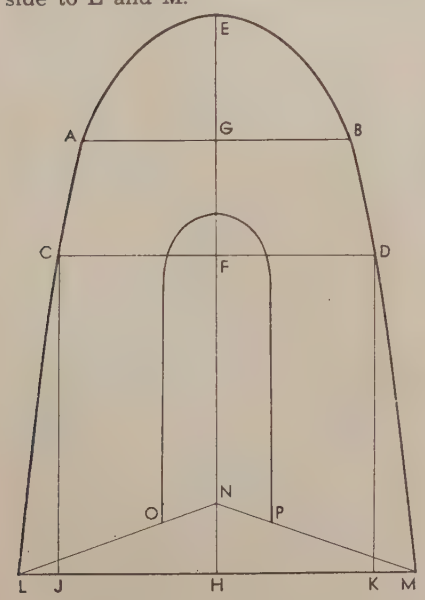


Pattern for a two-piece upper.

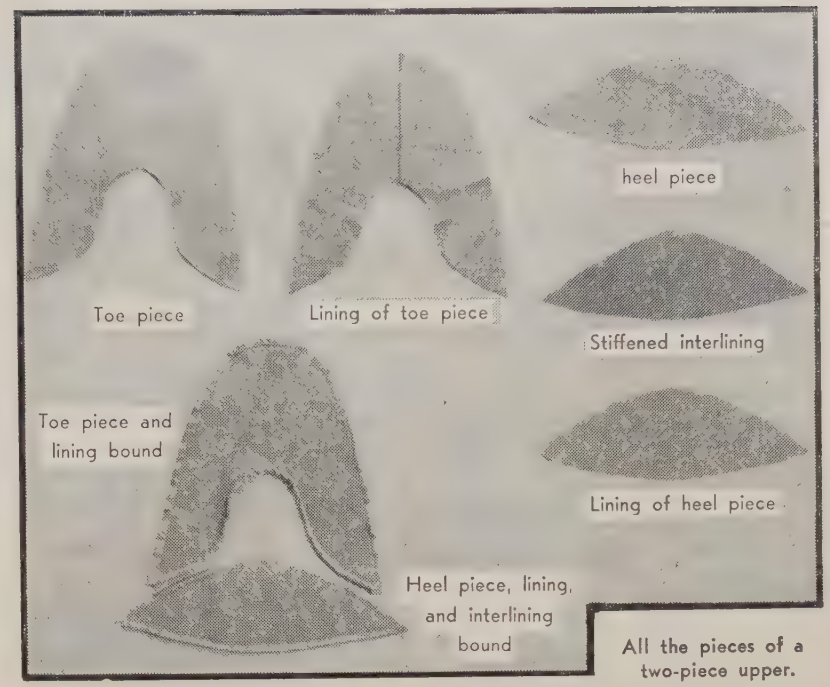
Heel: Draw a line VW the length of that measurement and mark its mid-point Y. From this point draw the measurement XY above the line. Raise the ends of the line VYW ¾in. in a curve as in the diagram to give an inward slope to the heel, which allows it to grip better.

One-piece Upper

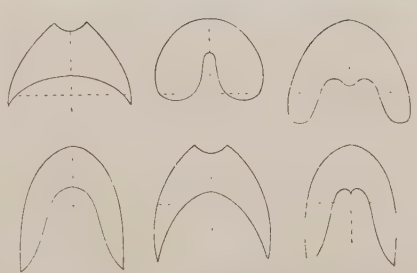
The toe and heel pieces can be combined into one pattern. Draw the toe piece as for a two-piece upper, then extend the line EF to 2¼ times its length to a point H. At H draw a line JK at right angles to EH and the same length as CD; extend it ¼in. on either side to L and M.



Pattern for a one-piece upper.



All the pieces of a two-piece upper.



Variations of shape for toe pieces. The measurements AB, CD, and EF must still be taken.

Mark the point N 1in. from H on the line EH and join LN and MN. On these lines measure from L and M the depth of the heel (XY) and mark these points O and P. Join the points L, C, A, E, B, D, and M, curving the toe piece, then shape the top edge. This can be varied on the basis of the patterns suggested for the two-piece uppers, but for a simple pattern the points O and P can be joined by a hairpin-shaped line as in the diagram. The toe can be open or closed, the depth of the side of the slipper can be altered, and the shape used for the instep line can be varied. A few suggestions are given in the diagram, but many others are possible.

Sole

The pattern for the sole can be made directly from the foot or from a comfortable, low-heeled shoe. Place the foot on a piece of paper and with the pencil held perpendicular draw round it. This pattern must be simplified by drawing curves following the boundaries of the drawing. The portion of the sole that is under the instep can be made a little narrower. Compare the pattern drawn from the foot with the sole of a comfortable, low-heeled shoe.

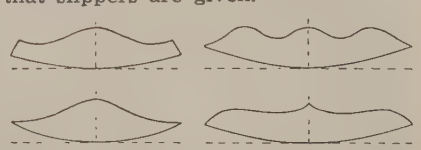
Making the Soles

Cork soles and soles of stout leather with the holes punched ready for stitching can be bought. Hides with the fur or wool left on are fairly easy to obtain and may be stitched without using an awl. All soles should be cut out with a sharp knife directly from the pattern. If the leather is thick enough, a groove should be marked on the under side of the sole to allow the stitching to sink below the surface and not come in contact with the ground; in this indentation holes should be pierced with an awl.

Rag or string soles: Waste rag 1 to 2in. wide or coarse string can be plaited into strips about 8yds. long. Cut a cardboard sole and coil the plait on to it, starting at the edge and coiling toward the centre, stitching each coil to the previous one. The first coil should be stitched to the cardboard, but each coil after that is fastened only to the previous one so that the cardboard may be removed afterward.

Carpet soles are merely a straightforward cutting-out job. All carpet soles must be bound with thin leather or strong cloth.

Other soles: Thin leather reinforced with layers of cloth makes a strong, flexible sole. Felt and canvas soles are also durable. Any materials that must be sewn or glued together to form thicker soles must be bound with leather or strong tape. Never buttonhole or satin stitch the edges, for only strong materials will stand the wear that slippers are given.



Variations of shape for heel pieces. The measurements VW and XY must still be taken.

Most slippers need inner soles. They are cut from the same pattern as the sole, but usually of the material of the upper. If the upper material is very fragile, the inner sole should be quilted to one or two layers of flannel or some similar material. The edges of the inner sole should then be bound.

Heels

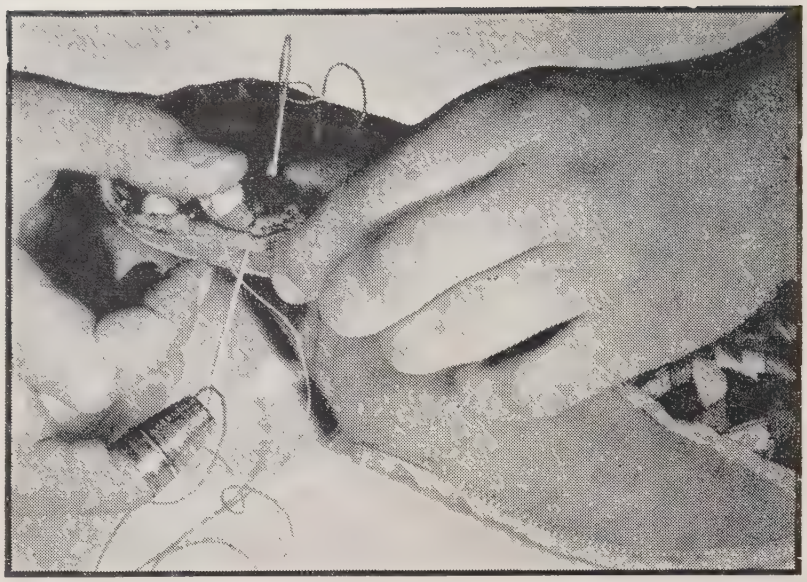
Though they can be bought cut from the same material as the soles, heels may be made successfully by gluing together layers of leather or cork. After the sole has been fixed to the upper the heel may be glued on. However, heels are not necessary for all slippers, and especially for those with soft, flexible soles.

Making the Uppers

Having cut out a paper pattern for the upper portion of the slipper, place it on the material to be used. If possible, tack the pattern to the material, but with such materials as thick leather it may be fixed with adhesive tape. Then cut out the material. Leather should be cut with a sharp knife, and if it is cut cleanly and the leather is thick, the edges need not be bound.

If the material needs lining for strength, warmth, or comfort, a suitable lining fabric is cut to the same pattern as the upper. Quilted fabrics make charming slippers and give the added advantages of warmth and strength provided by the extra layers of material; these must be lined, as must all fragile fabrics. The lining and the upper surface material should be tacked firmly or held together in some other suitable way so that both surfaces are perfectly smooth, and then the materials should be bound together with leather, tape, or even some of the surface material. As they do not come in contact with the ground, the uppers need not be bound with very strong material.

Odd scraps of material can be matched into attractive designs and lined to form the upper parts of the slippers. The principles of making patchwork were described in the "Journal" for June, 1950. Such patchwork usually needs an interlining to give strength and warmth.



Sewing sole and upper together with a double running stitch.

Stiffening

The wearing qualities of slippers are improved by the addition of stiffening. It makes the toe piece more durable, and it is necessary for the heels of two-piece uppers.

Cardboard, stiff canvas, or several layers of brown paper may be used. The material should be placed between the outer fabric and the lining of the upper and firmly attached to the lining. The stiffening should always be cut a little smaller than the surface pieces to reduce the number of thicknesses of material that must be sewn through.

Joining Sole and Upper

If the slippers are being made with one-piece uppers, the back seams (LO and MP in the diagram of the pattern) must be joined before upper and sole are fastened together. Then the procedure is the same for either one-piece or two-piece uppers.

Place the curved upper on top of the sole and fix it firmly with pins or adhesive tape. Mark the centre front and centre back of both sole and upper, then fix these points together with pins, adhesive tape, or some form of strong tacking.

Ease the fullness of the upper around the toe and begin to fix the toe portions of the slipper together with any of the forms of temporary fastening suggested. Work from about 2in. from the centre front around to the same position on the other side before adjusting the fullness. In some patterns the toe and heel pieces of the upper just meet and form a low-slung instep for the slipper; in other patterns the pieces overlap, so that the slipper is high all round and has a better grip of the foot. The slipper can be made into a scuff by not making an upper heel piece or into a sandal by fastening an ordinary upper heel to the sole but replacing the toe piece with two crossed straps.

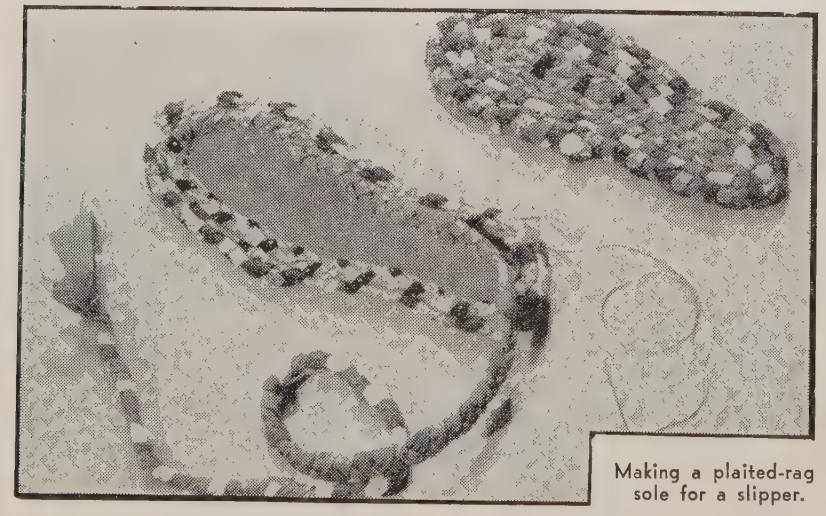
When the tacking is complete stitch with a strong thread that has been waxed if necessary, using a double sewing stitch and sewing through upper, inner sole, and sole. If the sole is of leather, the needle must go through holes made by the awl and the thread must be adjusted to lie in the groove made for it.

For all materials the double sewing stitch is used, worked with two needles at the same time, one above the material being sewn and the other beneath it. Both needles work an ordinary running stitch, but in the finished stitch the appearance is that of a backstitch.

Decoration

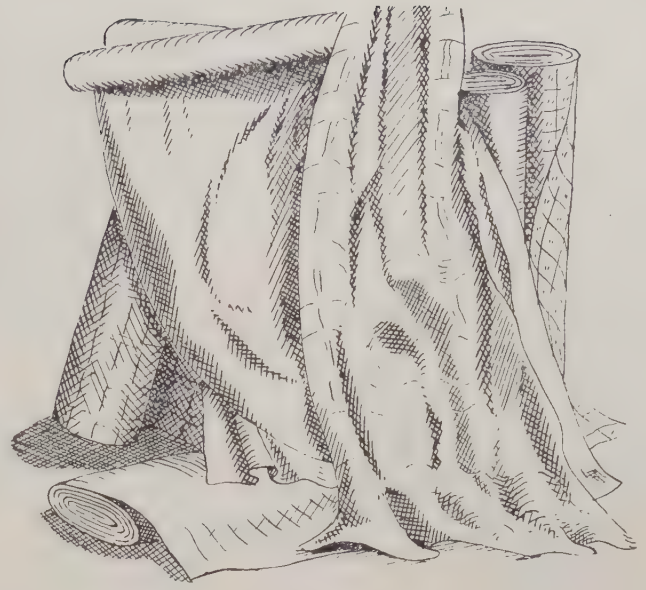
Any decoration desired should be worked on to the material before the slippers are made up, but braid, cord plaits, or pom-poms are added to the completed slipper.

Fur trimming is an attractive addition to a pair of soft slippers, applique, canvas stitches, and tapestry work look well on the correct material, and pretty peasant designs are most suitable. Quilted fabrics and patchwork seldom need any applied design, as the stitching is sufficient decoration.



Making a plaited-rag sole for a slipper.

People Use Wool more often than They Realise



WOOL is the most adaptable of textile fibres. Because of the scaly nature of its surface, it can be spun easily, woven into an extraordinary variety of fabrics, and felted—a little, a lot, or not at all. It can be dyed, it can be knitted, and it can produce hundreds of different patterns and textures. Its uses range from thick, heavy overcoatings to cobwebby fabrics as fine as silks; from business-like worsteds to rugged, go-anywhere tweeds; from cool, open-mesh summer shirtings to wind-cheating jackets. Yet wool is always turning up in new and unexpected forms, and people use it and wear it more often than they realise.

THERE are two basic wool yarns, woollen and worsted. Worsted is so named because when King Edward III, wisely acting on his wife's advice, in 1336 invited the first Flemish weavers to England to teach his countrymen their craft, they settled in Worsted, in Norfolk; from that time on finely woven cloth such as they produced has been known as worsted. A comparison of, say, a Harris tweed with a smooth serge worsted shows the difference, for in the language of wool the word "woollen" is used not to describe anything made of wool but to distinguish between "woollen" and "worsted" yarn.

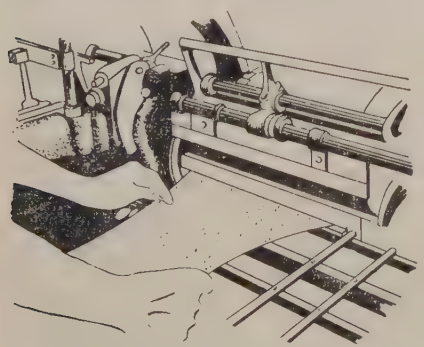
Difference in Treatment

The fundamental distinction lies in the crossing and intercrossing of the fibres in the preparation of woollen yarns; for worsted yarns the fibres are given an extra treatment called "combing" which smoothes them out so that they lie parallel to one another. In general, woollen yarns are made from short wools with high felting qualities and are softer and less smooth than worsted. Worsted yarns are usually made from finer varieties of wool and are spun into a level thread to produce a more even fabric.

Knitted Fabrics

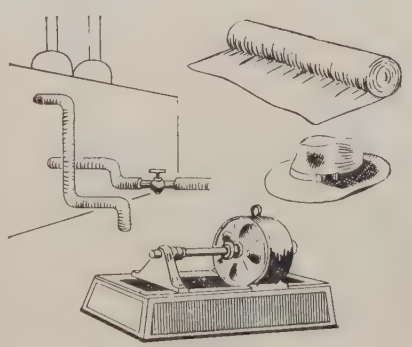
Wool is the best of materials for knitting, by hand or machine, and wool knitted garments are exceptionally elastic, crease resisting, and washable. Loosely knitted fabrics used to be very liable to shrinkage, but that problem has been overcome. Fit and good draping qualities are natural strong points of knitted garments, and probably no other kind of clothing is easier to keep trim and in good shape.

Knitting machines either produce flat fabrics for tailoring (usually called wool jersey) or make garments complete. Some of the new jersey fabrics, particularly for lingerie, are so fine that they are difficult to distinguish from light-weight woollen materials.



Felts

Some textile fibres cannot be felted at all, and others only a little, but wool, naturally scaly in structure, can be felted as little or as much as desired. Felting is very valuable in weaving, as it helps to provide cloths of different weights and textures. Pressed felt is not a woven material, but is obtained by compressing the wool fibres into a compact mass, and great variation in weight, quality, hardness, and thickness can be achieved.



Industry uses felts for absorbing vibration, heat insulation, and for deadening noise. Fashion makes free use of them for hats and accessories. Every household puts them to hundreds of uses as paddings, linings, mats, and coverings—everything from under-carpets to penwipers.

Better-known Types of Fabrics

Tweed is a "family" name originating in Scotland, given to a large variety of wool fabrics best adapted for suits and coats. Familiar names in the tweed family are Homespun, Shetland, Cumberland, Donegal, and Harris. Harris tweed is homespun from Scotland's "pure virgin wool" and hand woven by the crofters in their picturesque cottages in the islands of Harris, Uist, Lewis, Barra, and several others of the group forming the Outer Hebrides. Donegal tweed is called after the chief woollen centre of Ireland and is harsher than its Scottish cousin. Its attractive flecks of colour are obtained by means of dyes made from sloes, heather, and bilberries. The use of peat soot as a basic ingredient of certain dyes results in a rich variety of brown tonings and probably accounts for the faint peaty fragrance characteristic of Donegal tweed and distinct from the smell of Harris tweed, which has been described as a subtle blend of smoke and heather.

Flannel, either a woollen or a worsted fabric, is made in many patterns and colours. True flannel is all wool; flannelette is not wool, but cotton.

Gabardines usually are all worsted. They are supplied in heavy weights and waterproofed, for such uses as overcoatings and ski suits, and in light weights for fine dress fabrics.

Face cloths are specially finished, smooth-faced cloths with a lustre. Well-known examples are billiard cloth, doeskin for uniforms, box-cloth (very heavy), and melton, a pure wool overcoating.

Suitings is a term covering the many types of familiar worsted suiting and cheviot, saxony, barathea (an all-worsted cloth used for men's dress suits and military uniforms), hopsack, and serge (usually all worsted in many different weights).

Overcoatings include velour, an all-woollen heavy-weight cloth with a raised soft finish, the best quality being made from lambs' wool; and twills, all-woollen cloths such as Bedford cord and cavalry twill, the latter being most popular for riding breeches.

Dress weights is a wide term covering many types of wool boucle, georgettes, chiffons, taffeta, light-weight hopsacks, gabardines, nun's veiling, and a variety of printed wool fabrics.

CURRY is a popular dish in New Zealand, but housewives may be surprised to know that "India Curry, New Zealand Style" has been included as one of the six recipes representing this country in a fascinating cookery anthology, "The World Wide Cook Book", by Pearl V. Metzelthin. Even more surprised will be those whose experience of curry is limited to the left-over cold-meat variety, in which the strong seasoning is expected to disguise all deficiencies. This article by Norma K. Metson, Rural Sociologist, Department of Agriculture, Wellington, gives recipes for some special curries and the side dishes to accompany them, for a basic curry sauce used with fish, meat, or vegetables, and for other dishes which make use of this versatile flavouring.

A TRUE curry, in which the freshly ground spices are blended with great care, the main ingredients are cooked to perfection, and the various condiments and side dishes add even more variety of taste and texture, is a memorable feast for a special occasion. Simplified versions are quicker to cook and no more difficult to prepare than an ordinary stew, and they will add great interest to everyday menus, even though they may never quite satisfy those who have once been fortunate enough to enjoy the real thing.

The curry powder which can be bought in tins or bottles is not a single spice like cinnamon or pepper; it is a mixture of up to 10 or 15 ingredients. Chillies, coriander, turmeric (which gives the yellow colour), cardamon, allspice, ginger, and cloves are some of the more familiar components. In the East the spices included and the proportions used vary from district to district, and even between households, where the powder or paste is freshly made by grinding the chosen spices in a mortar or between two stones.

The powder is used to season a rich hot sauce, made by frying a mixture of vegetables and condiments in oil or butter, then adding stock or coconut milk, and simmering the mixture for a short time. A little thickening of flour made from ground wheat, maize, or rice may be added. The main ingredient—meat, chicken, fish, vegetables, or eggs—is frequently pre-cooked, cut into small pieces, and combined with the sauce for heating and seasoning rather than complete cooking. The amount of protein included may be quite small. The amount of fat used for the preliminary frying is relatively large and adds considerably to the richness and food value of the dish. The necessary bland contrast comes from the plain boiled or steamed rice with which the curry is served; mashed potatoes, macaroni, or spaghetti are possible substitutes.

In serving the curry, plain cooked rice, which must be dry and fluffy, not sticky, is heaped on the plate, curry is piled on top, selections from the side dishes (which always include chutney) are added, and everything is then mixed together and eaten with a spoon. The side dishes might include salted nuts, plain or toasted shredded coconut, salted, plain, or fried hard-boiled eggs, fried bananas, chutney, sweet or sour pickles, preserved ginger, fried onion rings, or small pieces of crisp, fried bacon.

Uses of Curry as a Seasoning

Curry as a seasoning can be used in many other dishes. Mulligatawny is the traditional curry-flavoured soup, hot in taste as well as temperature. A little curry powder mixed into a white sauce or salad dressing will add an interesting flavour to the vegetables with which it is served; added to the fat before the potatoes are fried it makes something different out of a very ordinary dish. It blends very well with hard-boiled eggs, as in egg sandwiches or stuffed eggs, and with tomatoes. Strong enough to give character to bland foods and distinctive enough to blend well with other definite flavours, curry powder is one of the most useful seasonings in the cook's cupboard.

As with other spices and flavourings, curry powder should be kept in an airtight tin or jar, bought in small quantities, and used up before freshness and flavour are lost. The powders available vary in strength and flavour, so the quantities in the recipes should not be regarded as absolute. Families will differ too in the amount of the flavouring they will enjoy, so do not season too liberally at first. The curry powder is usually added early in the recipe, as frying it in hot fat develops additional flavour. However, the dish should always be tasted before being served, and if necessary a little extra seasoning can be added. It is much more difficult, though, to dilute a curry which has been made too hot. One or two bay leaves, fried with the curry powder but removed before the remainder of the ingredients are combined, will add the subtle suggestion of yet another flavour to the whole dish.

Meat, Fish, or Egg Curry

- 1½ to 2lb. of chicken, rabbit, lamb, shrimps, crayfish, or fish, or 10 to 12 hard-boiled eggs
- 3 tablespoons of butter
- 1lb. of onions
- 2 large cloves of garlic
- 3 large tomatoes (chopped)
- 1 cup of chopped celery
- 1½ teaspoons of salt
- ¼ teaspoon of pepper
- 1 piece of green ginger, ½ x 2in., finely chopped
- 2 large green apples (sliced)
- 1 tablespoon of sugar
- 1½ tablespoons of curry powder
- 1½ tablespoons of flour
- 3 cups of coconut milk or stock
- 1 tablespoon of desiccated or freshly grated coconut

Cook the main ingredient till nearly done; chicken, rabbit, or lamb should be cut up and browned in fat before being simmered gently in water. Melt the butter, fry the onions and garlic, add the tomatoes, celery, green ginger, apples, sugar, and curry powder. Mix them all in a pan, add the flour, and then gradually add the stock or coconut milk and the coconut. Allow the mixture to cook into a thickened sauce. Add the foods to be curried, cover the pan, and cook for 5 to 6 minutes longer. Season with salt and pepper to taste and serve very hot with rice.

India Curry, New Zealand Style

- 2 tablespoons of butter or fat
- ⅔ cup of chopped onions
- 1½ cups of chopped apple
- 2 tablespoons of sultanas
- 1½ tablespoons of shredded coconut
- 1 large, firm banana, sliced
- 4 teaspoons of curry powder
- ¾ to 1 teaspoon of salt
- ¼ teaspoon of pepper
- 1⅓ cups of water or coconut milk
- 2 cups of diced cooked meat or fowl

Melt the butter in a pan, and fry the onion until it starts to colour. Add the apple and stir, add the sultanas and coconut, and mix them well. Add the curry powder, salt, and pepper. Fry the mixture for 5 minutes, stirring it until it is well blended. Add the water or coconut milk and the cooked meat. Cover the pan tightly, and cook for at least 1½ hours on very low heat or in a very slow oven; uncover the pan and add more water if the curry has become dry. Add the banana, mix it in, and cook the mixture, covered, for another ½ hour.

Crayfish, Shrimp, or Prawn Curry

- 4 cups of the fish to be used (cooked and cut up)
- 6 cups of cooked rice (1½ cups raw)
- 1 cup of boiling water
- 5 tablespoons of butter
- ½ cup of finely chopped onion
- 6 tablespoons of flour
- 2½ teaspoons of curry powder
- 1½ teaspoons of salt
- 1½ teaspoons of sugar
- ¼ teaspoon of ground ginger
- 2 cups of milk
- 1 teaspoon of lemon juice

Melt the butter, add the onion, and cook it gently until it is tender. Add the next five ingredients, and then slowly stir in the milk and water. Cook the mixture over boiling water, and stir it occasionally until it has thickened. Add fish and lemon juice, and reheat. Serve the curry, surrounded by rice, on a large dish.

Curried Fried Rice with Chicken

- 1½ cups of diced cooked chicken or pork
- 6 cups of cooked rice
- 3 tablespoons of fat
- 3 large onions
- Small piece of dried red pepper
- 2 teaspoons of peanut butter
- 1 cup of diced cooked shrimps or other fish
- 1 large cucumber, peeled and sliced thinly
- ½ cup of diced ham
- 1 teaspoon of cumin seed
- 1½ teaspoons of pounded coriander seed
- 1 clove of garlic, crushed
- ½ teaspoon of mace
- ¼ teaspoon of white pepper
- 1 teaspoon of salt
- 1 to 2 tablespoons of stock
- 2 hard-boiled eggs cut in eighths

Heat the fat in a pan, add the onions, and brown them slightly. Add the red pepper, peanut butter, and shrimps. Stir well and add the chicken and ham. Add the rice, which should be grainy and dry, and stir it for about 10 minutes until it is well browned. Add the spices and stock, mixing them well in. Turn out the mixture on to a hot dish, and garnish it with the cucumber and hard-boiled eggs. Serve it with chutney, pickles, and fried bananas.

Spiced Eggs (to Serve with Curry)

- 8 hard-boiled eggs
- ¼ cup of butter
- ¾ teaspoon of salt
- ¾ teaspoon of paprika
- ¾ teaspoon of black pepper
- ¾ teaspoon of cinnamon

Shell the eggs and prick them all over with a sharp fork so that the butter can penetrate to the centres. Heat the butter in a pan over a low flame and fry the eggs, turning them until they are light brown. Then roll the eggs in the well-mixed spices and serve them very hot with curry.

Apple Chutney (to Serve with Curry)

- 1 large green pepper, minced or grated (1 cup)
- 1 large sour apple (minced or grated, 1¼ cups)
- ¼ to ½ teaspoon of cayenne pepper
- ¾ teaspoon of paprika
- ¼ teaspoon of salt
- 1½ tablespoons of lemon juice

Scald, peel, and seed the pepper, peel and core the apple, grate or mince both very finely, and mix them thoroughly. Add the seasoning and beat with an egg beater. Add lemon juice and salt.

Date Chutney (to Serve with Curry)

- 1lb. of stoned dates
- ¼lb. of seeded raisins
- ¼lb. of onions
- ¼lb. of sugar
- ½oz. of garlic
- ½oz. of salt
- 6 red chillies
- 1 pint of vinegar

Chop the dates, raisins, and onions finely, put them in a pan with the other ingredients, and boil the mixture until it is tender and thickened.

Coconut Milk

To make coconut milk grate 4 cups of fresh coconut into a strainer lined with double cheese-cloth. Pour 2 cups of boiling water over the coconut, allow it to stand for 20 to 30 minutes, and then squeeze the pulp dry with the hands. This gives approximately ¾ pint of coconut milk. The procedure can be repeated two or three times with fresh hot water, 1 cup at a time. If fresh coconut is unobtainable, use 3 tablespoons of moist desiccated coconut to 1 cup of water and allow it to soak for 1½ hours.

Curry Sauce (Basic Recipe)

- 1oz. of butter
- ¾ pint of stock or water
- 1 to 1½ teaspoons of curry powder
- 1 teaspoon of chutney
- 1 tablespoon of cream
- 3 level dessertspoons of cornflour
- 1 medium onion, sliced thinly
- 1 small apple, diced
- 1 teaspoon of sugar
- 1 teaspoon of lemon juice

Melt the butter in a frying-pan or heavy saucepan and fry the apple and onion until the onion is pale gold but still crisp. Add the curry, chutney, and cornflour mixed with a little of the stock, mix it well, add the remaining stock, season with salt and pepper, and simmer the sauce for 20 to 30 minutes, stirring it occasionally. Just before serving the mixture add sugar, lemon juice, and cream. The amounts of curry powder, chutney, and lemon juice are varied to taste.

Cold Meat Curry

To make cold meat curry add ½ to ¾lb. of cold cooked meat, cut in neat dice, to the curry sauce (basic recipe) after it has simmered for 20 minutes, and continue the cooking until the meat is heated through.

Vegetable Curry

Add 2 to 3 cups of mixed cooked vegetables to the basic sauce after it has simmered for 20 minutes, and continue the cooking until the vegetables are heated through. The vegetables must not be over-cooked when they are added; they should still be a little crisp. Use peas, beans, diced root vegetables, cauliflower, or potatoes.

Fish Curry

Add ½ to ¾lb. of flaked cooked fish to the basic sauce after it has simmered for 20 minutes, and continue the cooking until the fish is heated through. Use milk and fish stock, or all milk, for the liquid, and serve the curry garnished with lemon slices and, if desired, slices of hard-boiled eggs.

Mulligatawny Soup

- 1 rabbit
- Gravy bones
- 1 carrot
- 1 turnip
- 6 onions
- 6 tablespoons of flour
- 1 tablespoon of curry powder
- Salt

Boil the rabbit in 2 quarts of water until it is quite tender. Take it out and remove the meat from the bones. Put the gravy bones in the same water, add the chopped vegetables, and simmer the stock for 2 hours, strain, mix the curry and flour to a smooth paste with ½ pint of water, and add this to the stock. Boil all for 15 minutes. Add the chopped rabbit meat, bring the soup back to the boil, and serve.

White Curry Soup

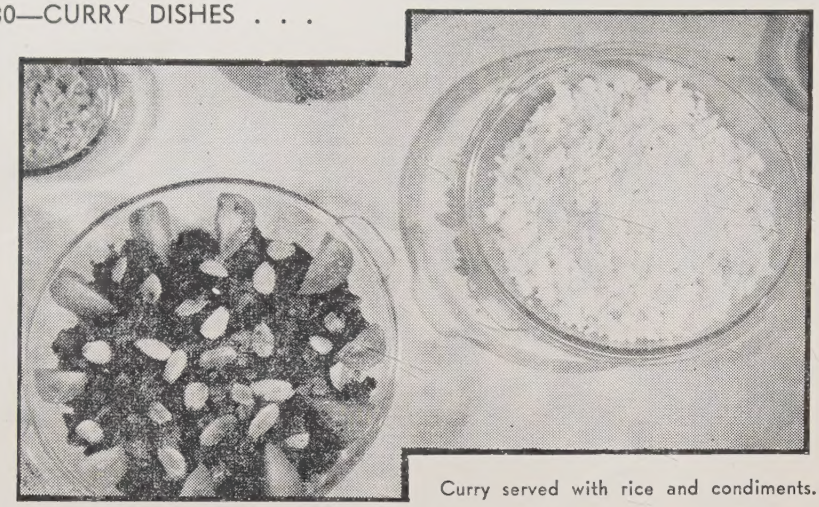
- 2 pints of white stock
- 1 tablespoon of cornflour
- 1 tablespoon of curry powder
- ½ pint of milk
- ¼ pint of cream
- 1 egg yolk
- 1 teaspoon of lemon juice
- 1 tablespoon of chopped parsley
- Seasoning
- Small pieces of cooked white meat

Bring the stock to the boil and add the curry and cornflour mixed to a smooth paste with the milk, stir the mixture until it boils, and simmer it for 10 minutes. Take it off the heat, add the egg yolk and cream mixed together, and also seasoning, parsley, and meat. Return it to the fire, stirring until it is almost boiling. Do not allow it to boil. Add the lemon juice just before serving the soup.

Curried Egg Sandwich Filling

- 1 hard-boiled egg
- ½ teaspoon of curry powder
- ½ teaspoon of lemon juice
- 1 dessertspoon of cream
- ½ teaspoon of anchovy sauce (optional)
- Pinch of cayenne pepper

Chop the hard-boiled egg and mix it thoroughly with the other ingredients. Use the filling on brown bread and butter.



Curry served with rice and condiments.

Curried Eggs

4 hard-boiled eggs
1oz. of butter
1 onion
1 dessertspoon of curry powder
1 teaspoon of cornflour
1 teaspoon of chutney
¼ pint of stock
1 tablespoon of cream
A squeeze of lemon juice
Salt and pepper

Melt the butter in a saucepan and add the onion very thinly sliced. Cook it for a few moments until it begins to turn golden brown. Add the curry powder, cornflour, chutney, salt, and pepper, and cook a few moments longer. Add the stock gradually and stir the mixture until it comes to the boil. Simmer it gently for 10 to 15 minutes. Either halve the eggs and pour the sauce over them or cut them in small pieces and add them to the sauce.

Curry Toast

1 cupful of left-over curry
Additional seasoning if required
2 eggs
1 teaspoon of chopped parsley

If there are any large pieces of meat in the curry, cut them up finely. Reheat the curry with the egg yolks mixed into it, and then pile it on fingers of hot buttered toast. Beat the egg whites stiffly, and then add seasoning and chopped parsley. Spread this mixture over the curry and toast and put it into a hot oven or under a grill to brown.

Curried Kidney and Bacon Sauce

2 kidneys
1 medium onion
4 rashers of bacon
1 teaspoon of curry powder
1 dessertspoon of butter
2 teaspoons of tomato sauce
1 teaspoon of flour
1 cup of water
Salt and pepper to taste

Slice the onion and fry it for a few moments in the butter, add the cut up kidneys and bacon, and fry 3 or 4 minutes more. Add remaining ingredients, bring the sauce to the boil, and simmer it until the meat is cooked. Serve this over cooked spaghetti, rice, macaroni, or mashed potatoes.

Babotje (South Africa)

2lb. of minced meat
1 thick slice of bread (1½oz.)
¼ cup of milk
1 large egg
1½ tablespoons of curry powder
2 eggs, beaten
1 teaspoon of salt
1½ tablespoons of lemon juice or vinegar
½ teaspoon of pepper
14 almonds, blanched and pounded
2 medium onions, chopped fine
2 tablespoons of fat or butter
6 orange or lemon leaves (optional)
¼ teaspoon of salt
1½ cups of milk
1 tablespoon of sugar

Mince the meat (raw or cooked). Soak the bread in milk and beat it with a fork until it is creamy. Beat in the egg and add curry powder, sugar, salt, pepper, almonds, and lemon juice. Fry the onions in butter or fat and allow them to brown. Add them to the mixture and stir it well. Grease a baking dish and add 2 or 3 orange leaves at the bottom if desired. Spread the mixture into the dish and distribute 2 or 3 orange leaves through it. Place a buttered paper on top and bake it in a moderate oven 30 to 35 minutes for raw meat and 20 to 25 minutes for cooked meat. Remove the paper, mix the eggs with milk and salt, and pour the mixture over the dish. Reduce the oven heat and bake the dish until the custard is set. Serve with cooked tomatoes and boiled potatoes or rice.

Cottage Cheese Made from Sour Milk

THOUGH as a general rule New Zealanders like milk to be as fresh as they can get it, there is no reason why it should not be used if it goes sour. Cottage cheese, which is nutritious, simple to make, and can be used in a wide variety of ways, is one of the best methods of using up sour milk. In this article Helen Paine, Rural Sociologist, Department of Agriculture, Wellington, outlines the making of cottage cheese and gives recipes.

WHEN milk sours it thickens and slowly forms a solid curd as the whey separates from it. Making cottage cheese is essentially the process of draining off the whey. The curd may take a long time to form, especially in cold weather, but the process can be speeded up by adding salt to the sour milk and then warming it very gently to blood heat. If the heat is too great, a tough, dry curd forms instead of the smooth, soft-textured type that results from natural souring.

When the curd has begun to separate from the whey the milk is strained through butter muslin. Line a colander or wire strainer with butter muslin and tip the milk into it. When most of the whey has separated from the curd place a saucer and a heavy weight on the cheese and leave it to drain over a basin. The cheese is ready for use in 12 hours or slightly less. A pint of milk makes about 4oz. of cottage cheese. This can be seasoned and used in salads, as a filling for sandwiches, or as a savoury base. It can also be used in desserts, for though it has a characteristic texture, it has a bland flavour that is suitable for both sweet and savoury mixtures.

Mixed Salad on Cheese

Place a heaped tablespoon of cottage cheese in a lettuce leaf, put chopped-up vegetables or fruit on the cheese, and garnish with a small spoonful of cheese.

Pear and Cheese Salad

Cut a ripe pear in half, scoop the core out, and stuff the hole with cottage cheese. Serve on a lettuce leaf. Peaches, ripe apples, pineapple slices, etc., could be used for this salad. Prunes and dates stuffed in the same way can be used to garnish a chopped salad.

Many savoury sandwich spreads can be made with a base of cottage cheese. These mixtures may be spread on to buttered crackers or rolls and may also be made into sandwiches.

Onion and Cheese Spread

4oz. of cottage cheese
2 tablespoons of chopped chives or spring onions
Salt and pepper to taste
2 or 3 chopped olives (These make of this spread a party specialty, though they are not essential.)

Herb Cheese Spread

4oz. of cottage cheese
1 teaspoon of celery salt or celery chopped very finely
½ teaspoon of sage, thyme, or mixed herbs
1 tablespoon of lemon juice
Salt, pepper, and, if possible, a little grated horse radish to taste

Orange Cheese Spread

4oz. of cottage cheese
Grated rind of 1 orange
1 teaspoon of sugar
1 tablespoon of orange juice
½ teaspoon of cinnamon

Savouries from Spread Mixtures

To make savouries from the spread mixtures toast one side only of several pieces of bread. Butter the untoasted side, spread the savoury mixture on to it, and heat the savoury under a grill.

Cottage Cheese Fold-overs

3oz. of sugar
3oz. of butter
8oz. of cottage cheese
2 cups of flour
½ teaspoon of nutmeg

Cream the butter and sugar, add the nutmeg and cottage cheese to the mixture, and stir in enough flour to make a firm dough. (The amount will vary with the consistency of the cottage cheese.) Form the mixture into a ball, wrap it in wax paper, and leave it overnight in a cool place, a refrigerator if possible. Roll out the dough very thinly on a floured board and cut it in 3in. squares. Place a teaspoon of jelly or jam in the centre of the square and fold the corners into the middle. Bake it in a hot oven for 15 minutes. The fold-overs may be eaten as tarts or served with custard as a dessert.

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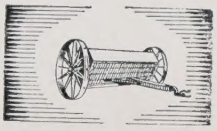

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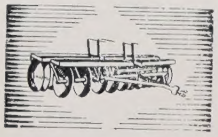

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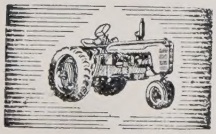

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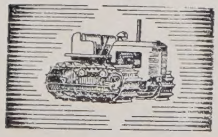

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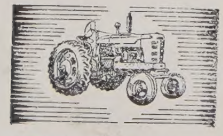

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